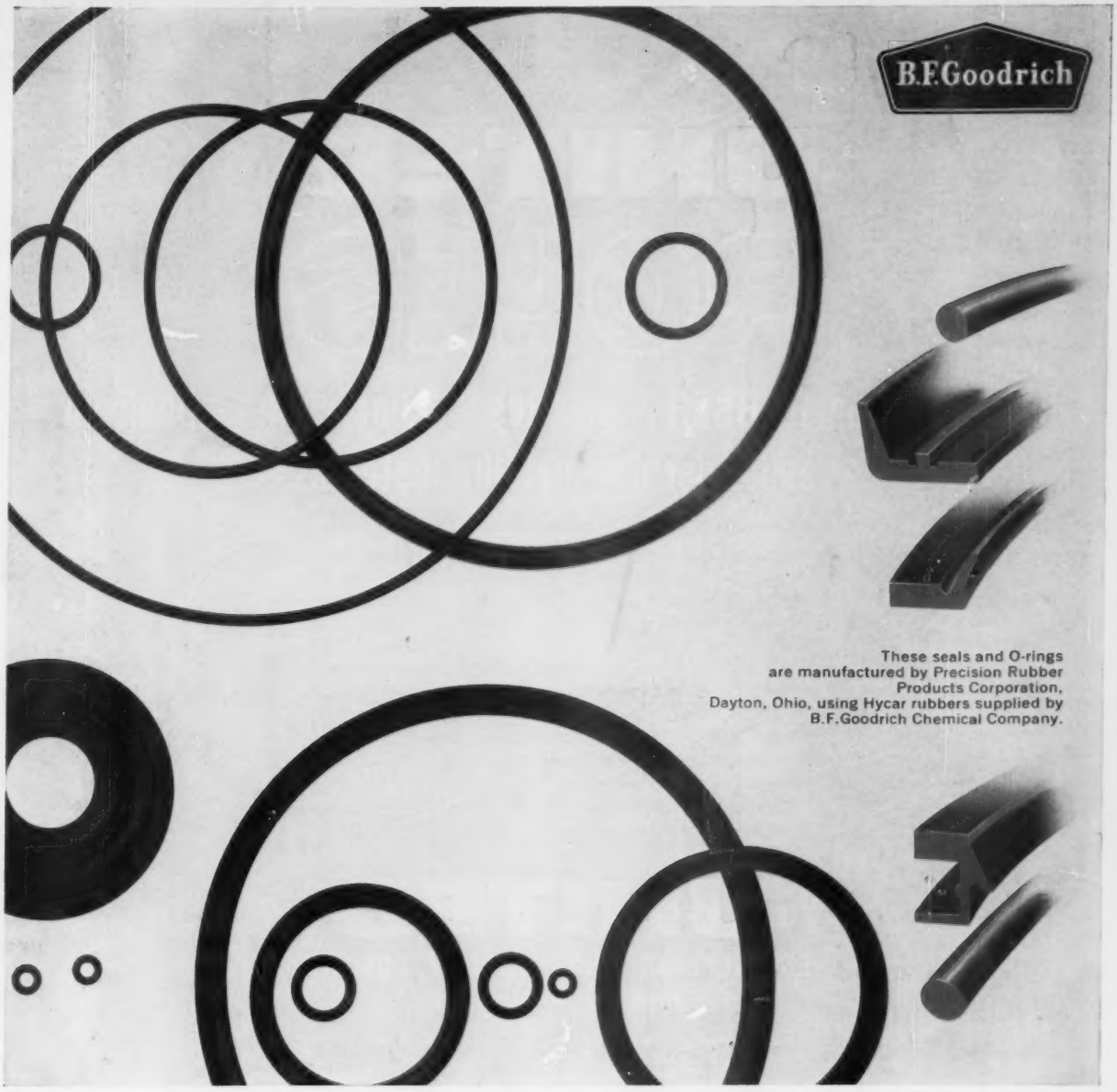

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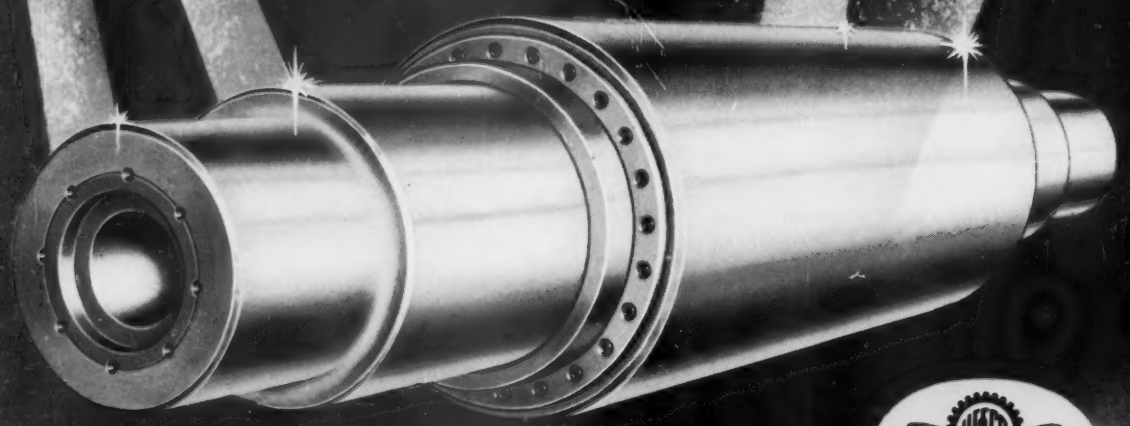

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OCTOBER, 1961 VOL. 90, NO. 1

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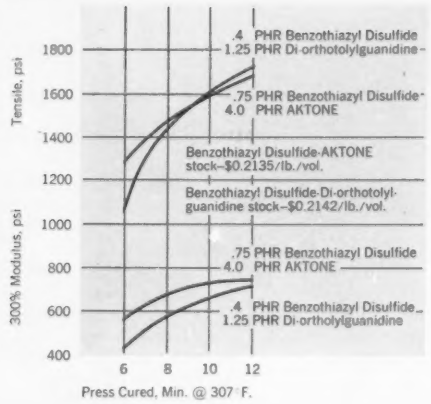

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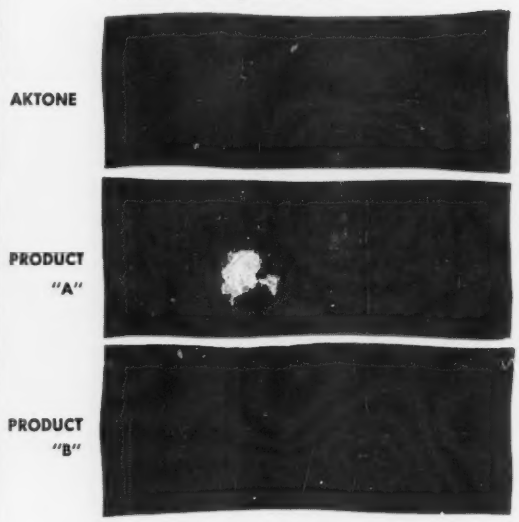

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Highlights Sidelights *of the News...*

October, 1961

The 80th meeting of the ACS Division of Rubber Chemistry held recently in Chicago, Ill., featured a joint symposium of the Rubber and Petroleum Divisions and the announcement of new officers for the 1961-62 season...Divisional registration was estimated at 1200 members and guests (page 113).

Synthetic rubber and carbon black facilities in the Texas Gulf Coast area sustained little or no damage as a result of the recent hurricane Carla . . . Many plants were shut down temporarily to permit employees to be with their families, however (page 118).

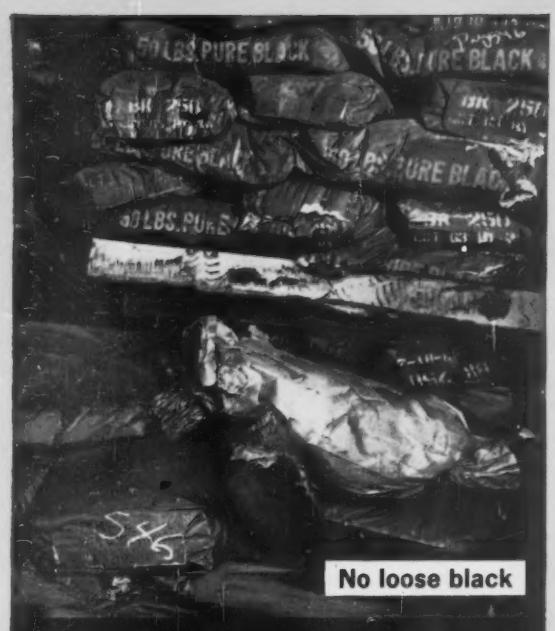
The British Patent Office has granted a patent to the General Tire & Rubber Co. covering its high-Mooney oil-extended rubber development . . . The British Patent Office provided for the patent grant after dismissing an objection entered by the Polymer Corp. of Sarnia, Ont., Canada, which claimed that the development was not patentable because it was obvious in view of prior art (page 121).

DuPont has moved to dismiss its three-year old law suit against Phillips Petroleum following an out-of-court settlement of litigation over DuPont's composition of matter patent on high-density polyethylene . . . The settlement involves an exchange of patent rights (page 123).

According to a report filed with the Securities and Exchange Commission, Edward O. Lamb, his associates and affiliated companies, now own more than 235,000 common shares of the Seiberling Rubber Co. . . . Some experts are of the opinion that the continued acquisition of Sieberling common by Mr. Lamb indicates a possible proxy fight in 1962 for control of Seiberling (page 121).

The U.S. Justice Department has filed suit against four chemical companies charging them with fixing prices, rigging bids and allocating markets for carbon dioxide . . . The companies, General Dynamics, Olin Mathieson, Air Reduction and Chemetron, all have pleaded not guilty to the criminal charges (page 136).

The rubber industry's highest honor, the Charles Goodyear Medal, has been won by Dr. Melvin Mooney, retired U.S. Rubber Co. scientist . . . Dr. Mooney will receive his award at the forthcoming Spring Meeting of the ACS Division of Rubber Chemistry in Boston, Mass. (page 119).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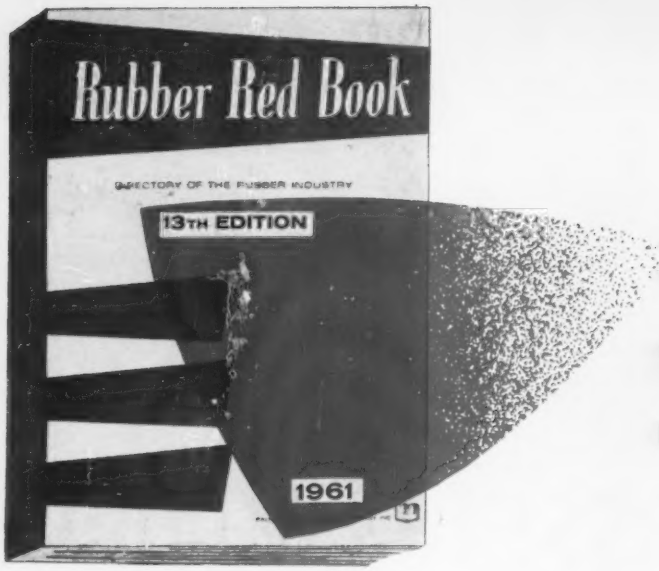

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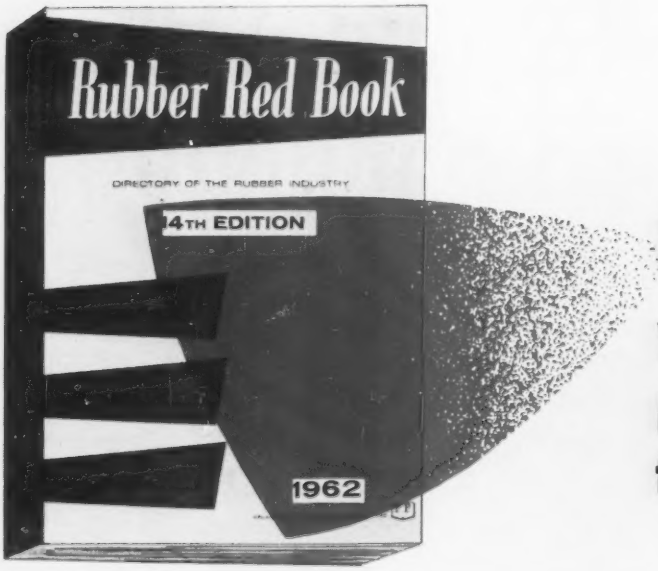

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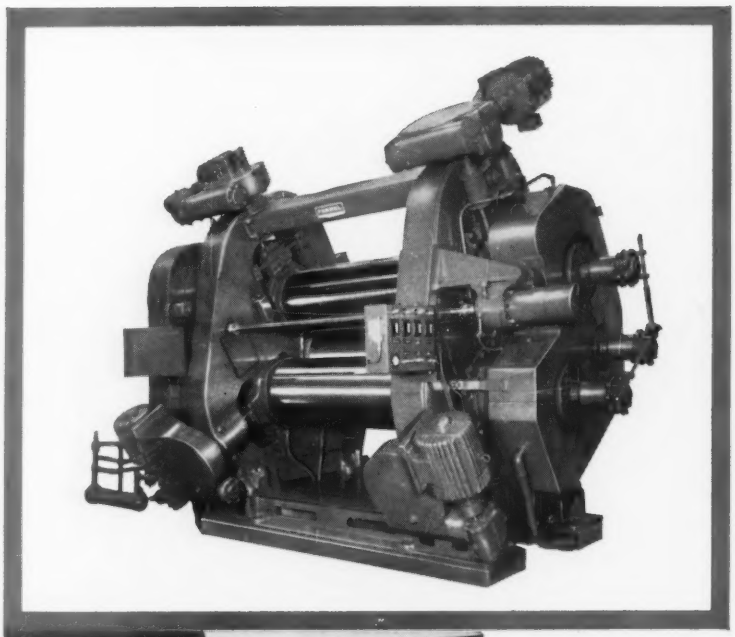
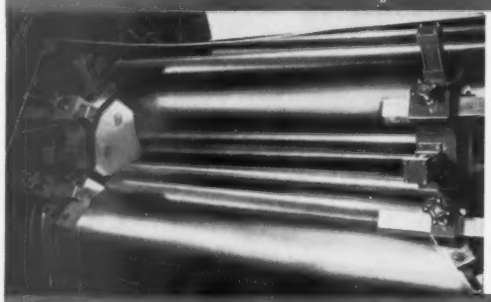
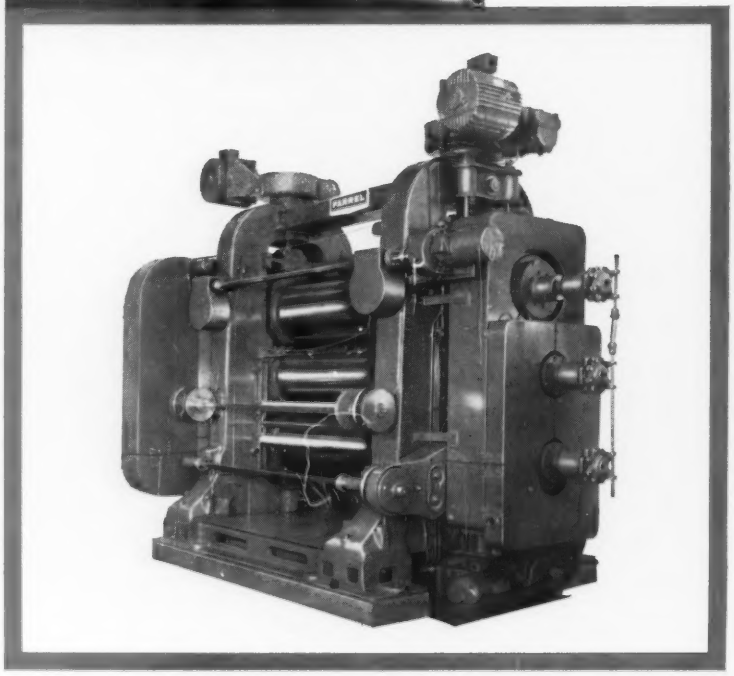




These 3-roll calenders were equipped with special air-operated, self-adjusting guides (as shown), designed to follow the motion of the cross-axis roll. Separate deflectors plow the edge of the rubber back into the pass between the guides.



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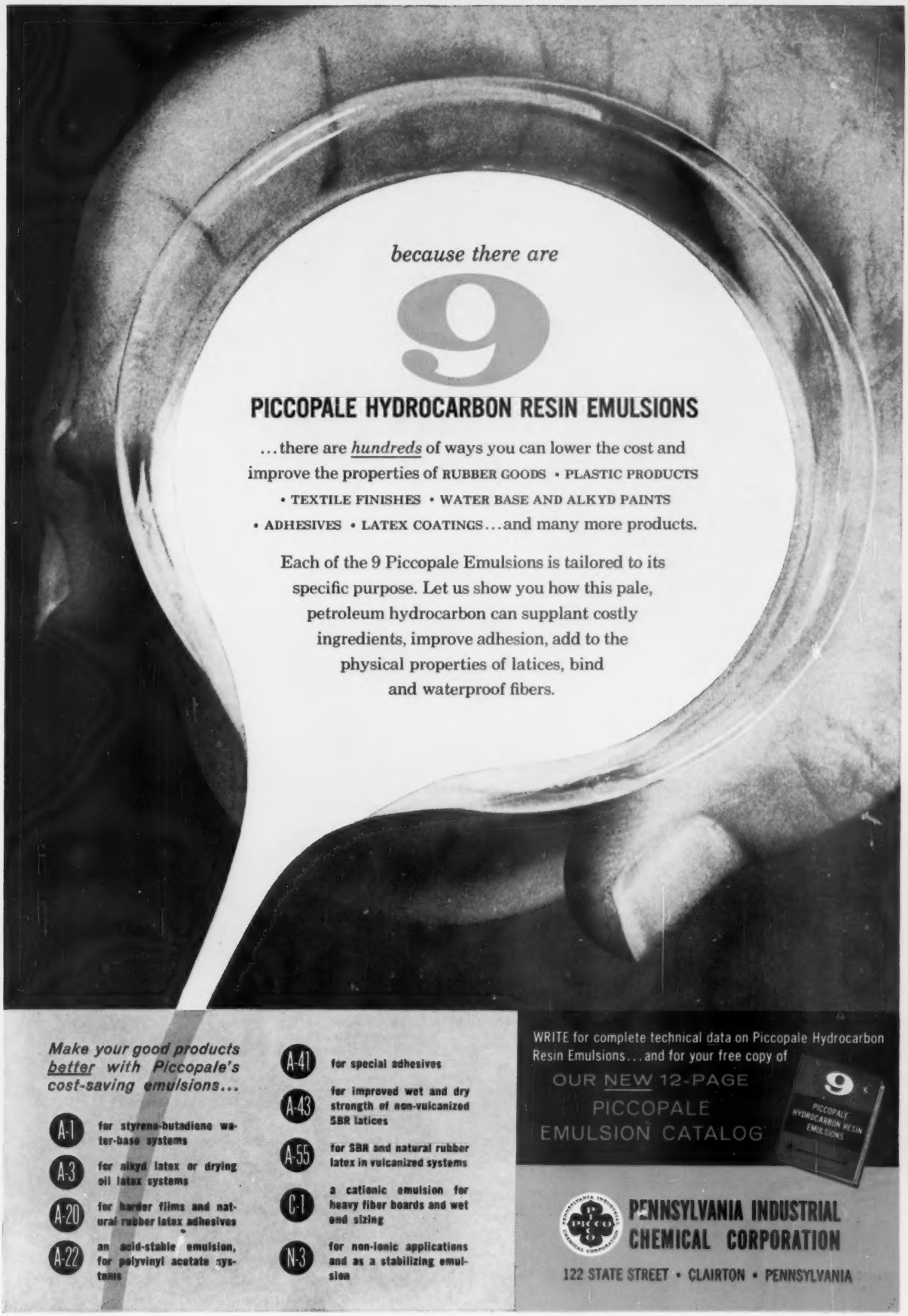

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coming events

Oct. 20. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Oct. 20. Joint Meeting of New York, Connecticut and Philadelphia Rubber Groups, Henry Hudson Hotel, New York, N. Y.

Nov. 2. Rhode Island Rubber Club, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 3. Philadelphia Rubber Group, Fall Dance, Manufacturers Country Club, Oreland, Penna.

Nov. 7. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Nov. 15. Society of Plastic Engineers, Regional Technical Conference on Vinyl, Statler Hilton Hotel, New York, N. Y.

Nov. 16. Northern California Rubber Group, Technical Meeting, Berkeley, Calif.

Nov. 16. Quebec Rubber & Plastics Group, Technical Meeting, Montreal, Quebec, Canada.

Nov. 17. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

Nov. 17. Connecticut Rubber Group, Technical Meeting.

Nov. 17-18. Southern Rubber Group, Memphis, Tenn.

Nov. 26-Dec. 1. American Society of Mechanical Engineers, Winter Annual Meeting, Statler Hilton Hotel, New York, N. Y.

Nov. 29-Dec. 1. Tenth Annual Wire & Cable Symposium, Berkeley-Carteret Hotel, Asbury Park, N. J.

Dec. 2. Northern California Rubber Group, Christmas Party.

Dec. 7. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 8. Detroit Rubber & Plastics Group, Christmas Party, Statler Hilton Hotel, Detroit, Mich.

Dec. 8. Los Angeles Rubber Group, Christmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 9. Southern Ohio Rubber Group, Christmas Party.

Dec. 12. Buffalo Rubber Group, Christmas Party, Buffalo Trap and Field Club, Buffalo, N. Y.

Dec. 15. Boston Rubber Group, Christmas Party, Somerset Hotel, Boston, Mass.

Dec. 15. Chicago Rubber Group, Christmas Party, Morrison Hotel, Chicago, Ill.

Dec. 15. New York Rubber Group, Christmas Party, Henry Hudson Hotel, New York, N. Y.

Dec. 26-31. American Association for the Advancement of Science, Chemistry Division Annual Meeting, Denver, Colo.

Jan. 26, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Jan. 26, 1962. Quebec Rubber & Plastics Group, Joint Technical Meeting with SPE, Montreal, Quebec, Canada.

Jan. 26, 1962. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

Jan. 30-Feb. 2, 1962. Society of Plastics Engineers, 18th Annual Technical Conference, Penn-Sheraton Hotel, Pittsburgh, Penna.

Feb. 5-9, 1962. ASTM Committee Week, Statler Hilton Hotel, Dallas, Texas.

Feb. 7-9, 1962. Committee D-11 on Rubber and Rubber-Like Materials, ASTM, Statler Hilton Hotel, Dallas, Texas.

Feb. 8, 1962. Fort Wayne Rubber & Plastics Group, Technical Meeting, Van Orman Hotel, Fort Wayne, Ind.

Feb. 23, 1962. Akron Rubber Group, Annual Dance, Sheraton Hotel, Akron, Ohio.

Feb. 23, 1962. Quebec Rubber & Plastics Group, Ladies Night, Victoria Hall, Montreal, Quebec, Canada.

March 2-4, 1962. Boston Rubber Group, Ski Weekend.

March 13-14, 1962. Manufacturing Chemists' Association, Symposium on Packaging of Chemical Products, Chase-Park Plaza Hotels, St. Louis, Mo.

March 16, 1962. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

March 20-29, 1962. American Chemical Society, 141st National Meeting, Washington, D. C.

March 22, 1962. Quebec Rubber & Plastics Group, Technical Meeting, Montreal, Quebec, Canada.

March 23, 1962. New York Rubber Group, Spring Meeting.

April 5, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

April 19, 1962. Quebec Rubber & Plastics Group, Technical Meeting, Montreal, Quebec, Canada.

April 24-27, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Statler, Boston, Mass.

April 26, 1962. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

May 4, 1962. Chicago Rubber Group, Technical Meeting, Morrison Hotel, Chicago, Ill.

May 4, 1962. Division of Rubber Chemistry, Chemical Institute of Canada, Niagara Falls, Ontario, Canada.

May 14-18, 1962. Institut Francais du Caoutchouc, International Rubber Conference, Paris, France.

May 22-25, 1962. Institution of the Rubber Industry, 4th International Rubber Technology Conference, Church House, Westminster, London, England.

June 1, 1962. Quebec Rubber & Plastics Group, Golf Outing.

June 7, 1962. New York Rubber Group, Summer Outing.

June 22, 1962. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 24-29, 1962. ASTM Annual Meeting and Apparatus Exhibit, Hotel Statler, New York, N. Y.

July 20, 1962. Chicago Rubber Group, Golf Outing, St. Andrews Country Club, West Chicago, Ill.

August 2, 1962. New York Rubber Group, Golf Outing.

Sept. 9-14, 1962. American Chemical Society, 142nd National Meeting, Atlantic City, N. J.

Sept. 30-Oct. 5, 1962. ASTM Pacific Area Meeting and Apparatus Exhibit, Hotel Statler, Los Angeles, Calif.

Oct. 16-19, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Sheraton, Cleveland, Ohio.

Oct. 19, 1962. New York Rubber Group, Fall Meeting.

Nov. 25-30, 1962. American Society of Mechanical Engineers, Winter-Annual Meeting, Statler Hilton Hotel, New York, N. Y.

Dec. 14, 1962. New York Rubber Group, Christmas Party

Jan. 22-25, 1963. Society of Plastic Engineers, 19th Annual Technical Conference, Ambassador Hotel, Los Angeles, Calif.

Feb. 4-8, 1963. ASTM Committee Week, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

March 31-April 5, 1963. American Chemical Society, 143rd National Meeting, Los Angeles, Calif.

May 7-10, 1963. Division of Rubber Chemistry, American Chemical Society, Royal York Hotel, Toronto, Ontario, Canada.

June 23-28, 1963. ASTM Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Sept. 8-13, 1963. American Chemical Society, 144th National Meeting, New York, N. Y.

Sept. 10-13, 1963. Division of Rubber Chemistry, American Chemical Society, Hotel Roosevelt, New York, N. Y.

April 28-May 1, 1964. Division of Rubber Chemistry, American Chemical Society, Sheraton-Cadillac Hotel, Detroit, Mich.

Sept. 1-4, 1964. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

May 4-7, 1965. Division of Rubber Chemistry, American Chemical Society, Fountainebleau Hotel, Miami Beach, Fla.

Oct. 19-22, 1965. Division of Rubber Chemistry, American Chemical Society, Bellevue-Stratford Hotel, Philadelphia, Penna.

May 3-6, 1966. Division of Rubber Chemistry, American Chemical Society, Fairmount Hotel, San Francisco, Calif.

Sept. 13-16, 1966. Division of Rubber Chemistry, American Chemical Society, New York, N. Y.

May 2-5, 1967. Division of Rubber Chemistry, American Chemical Society, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

Sept. 12-15, 1967. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

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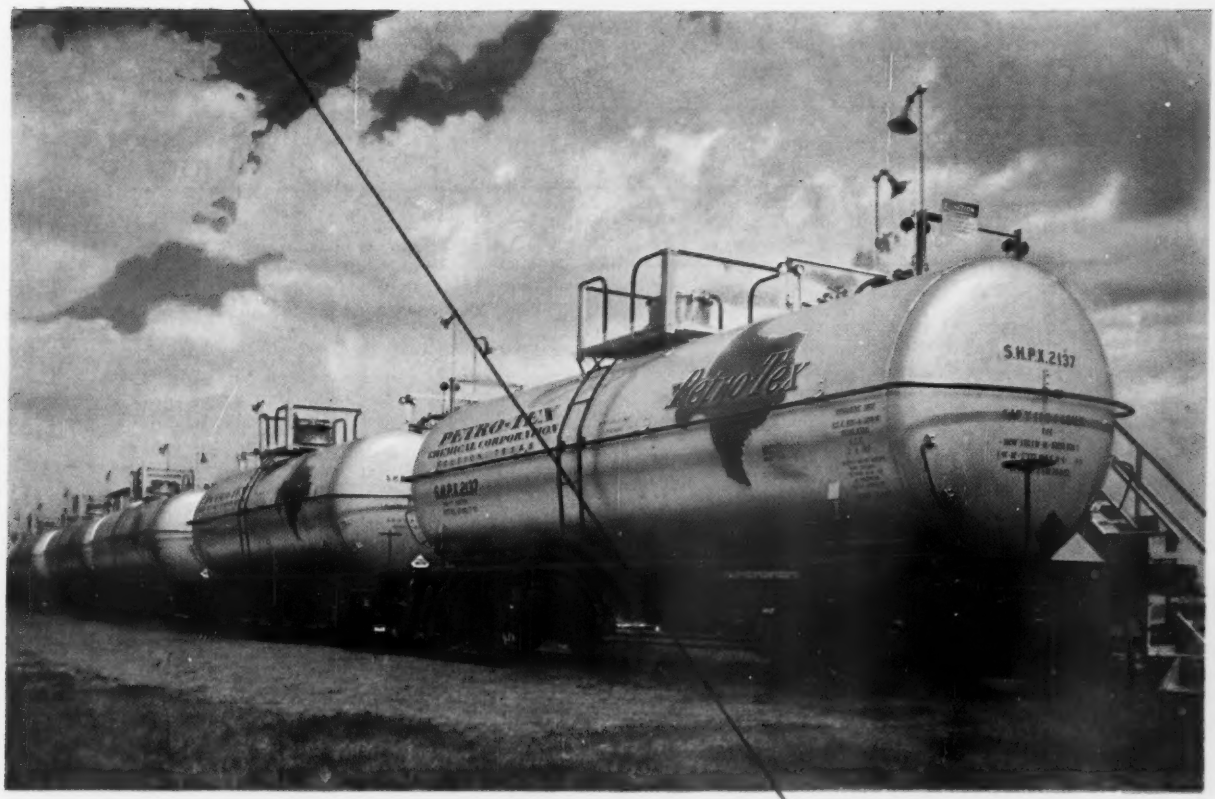


BUTADIENE Highest commercial quality from the world's largest non-captive production.

BUTENE-1 Highly reactive high purity alpha-olefin with low moisture.

BUTENE-2 Beta unsaturated high purity olefin, and virtually free of Butene-1 isomer.

DIISOBUTYLENE Clear water-white mixture of 2,4,4-Trimethylpentene-1 and 2,4,4-Trimethylpentene-2.

TRIISOBUTYLENE Clear water-white mixture of 2,2,4,6,6-Pentamethyl-heptene-3 and 2-Neopentyl-4,4-dimethyl pentene-1.

ISOBUTYLENE Major continuous production of high purity material.

TETRAHYDROPHTHALIC ANHYDRIDE Carload quantities in 165 lb. drums from captive supplies of the two starting components.

Petro-Tex®

PETRO-TEX CHEMICAL CORPORATION

8600 PARK PLACE. HOUSTON 17. TEXAS

JOINTLY OWNED BY
FMC Corporation and
Tennessee Gas Transmission Company

COMMERCIAL SOLVENTS CORPORATION

NITROPARAFFINS DEPARTMENT

260 MADISON AVENUE, NEW YORK 16, N. Y.

Atlanta • Boston • Chicago • Cincinnati • Cleveland • Detroit • Los Angeles • New Orleans • Newark • New York • St. Louis
San Francisco • In Canada: McArthur Chemical Co. Ltd., Montreal • In Mexico: Comsolmex, S.A., Mexico 7, D. F.

SUBJECT:	Hydroxylamine Salts	DESCRIPTION:	Versatile nitroparaffin derivatives with unlimited application possibilities
ACTION DESIRED:	Consider them for synthesis, purification, for your research projects		

Hydroxylamine salts have reactivity characteristics possessed by no other chemical. Industry is now using these versatile nitroparaffin derivatives in ever increasing quantities, and new applications are continually being discovered. As reducing agents, oxidizing agents — for synthesis, purification and biological systems — hydroxylamine salts offer you unlimited opportunity in research and product development.

Oxidation — reduction.

Hydroxylamine salts are well-known reducing agents for metal ions such as ferric, cupric, and silver, and also for non-metallics such as organic peroxides and certain dyes. Because of this property, these salts have found industrial applications in dyeing, purification, and refining processes. The salts are very stable in acidic media, a property not possessed by many reducing agents.

Less well known, however, is the action of hydroxylamine as an oxidizing agent. This property has received little study, but it warrants your further investigation —particularly where oxidizing agents now used are not fully satisfactory.

For dyeing synthetic fibers.

Hydroxylamine sulphate is an ideal reducing agent in the cuprous ion method for dyeing synthetic fibers. One step in the process is the reduction of the cupric ion to the cuprous form, and hydroxylamine sulfate is reported to act as a reservoir for the cuprous ion as it is formed, thus avoiding precipitation of metallic copper which would result in dull colors. (It has also been reported that hydroxylamine acts directly on the fibers and makes them more easily dyed by direct wool dyes. It is possible that this process will soon displace the cuprous ion method when it has been more thoroughly evaluated.)

Shortstopper for synthetic rubbers.

The sulfate and chloride salts of hydroxylamine are used as non-discoloring shortstoppers in the production of butadiene-styrene rubber, GR-N-type synthetic rubber, and other polymers. In this use the hydroxylamine is added to inhibit further polymerization when the reaction has reached the desired conversion. The result, when hydroxylamine is used, is rubber with better color.

And reports from users indicate that CSC hydroxylamine salts have been, and are now being used, with *both* hot and cold polymerizations. What's more, their use is *not* confined to specialty rubbers, but they are also being used successfully with all-purpose synthetic rubber of the styrene-butadiene type.

The principal reason behind the increased use of hydroxylamine is the better color it produces in rubbers as compared with hydroquinone-stopped synthetics.

For synthesis.

The hydroxylamines are valuable for chemical synthesis of oximes, hydroxamic acids, and numerous intermediates—also for preparation of anti-skinning agents,

Physical Properties	HYDROXYLAMMONIUM ACID SULFATE	HYDROXYLAMMONIUM SULFATE	HYDROXYLAMMONIUM CHLORIDE
Formula	$NH_2OH \cdot H_2SO_4$	$(NH_2OH)_2 \cdot H_2SO_4$	$NH_2OH \cdot HCl$
Molecular Weight	131.11	164.14	69.50
Melting Point, °C	Indefinite	177*	152*
pH of 0.1M Aqueous Solution at 25°C	1.6	3.7	3.4
Solubility at 25°C, g/100 g solvent			
In Water	Approx. 390	63.9	94.7
In 95% Ethanol	4.3	0.2	10.5
In Methanol	20.2	0.1	17.5

*Melts with decomposition.

anti-rusting agents, and pharmaceuticals. For example, hydroxylamine reacts readily with aldehydes and ketones to give high yields of oximes which are useful in a variety of applications, including the preparation of antioxidants and stabilizers. When added to inks and paint, oximes are useful as anti-skinning agents.

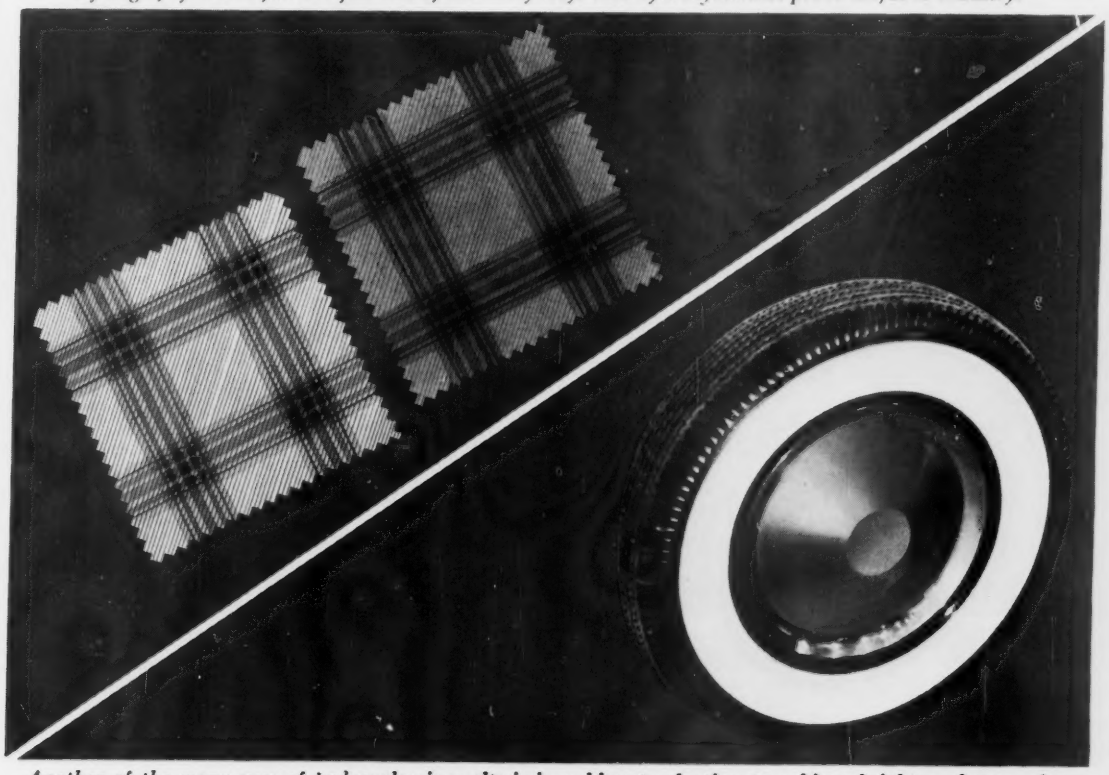
Effects on proteins and biological systems.

Hydroxylamines inhibit certain enzymes, such as catalase. Gelatin treated with hydroxylamine shows considerable resistance to acid etching. It also inhibits bacterial growth, and many of its derivatives have fungicidal properties. And hydroxamic acid, prepared from hydroxylamine, possesses interesting pharmacological activity.

Can hydroxylamines help you explore new fields within your field?

Most probably the answer is "yes." With their unique properties and wide range of utility—plus the fact that they are now available in commercial quantities at moderate prices – hydroxylamines possess unlimited potential. They offer you unlimited research and product development opportunity.

There is a difference in color when synthetic fiber (on left) is treated with hydroxylamine during dyeing. Dyeing of synthetic fibers is just one of the many ways that hydroxylamines prove useful to industry.



Another of the many uses of hydroxylamine salts is in rubber production to achieve brighter, clearer color.

HYDROXYLAMINES

For samples and complete technical data, fill out coupon below and mail today.

Nitroparaffins Department
COMMERCIAL SOLVENTS CORPORATION
260 Madison Avenue, New York 16, N. Y.

CSC

_____Please send me complete technical data on hydroxylamines.

_____Please send me samples for test purposes.

*Name*_____ *Title*_____

*Company*_____ *Address*_____

*City*_____ *Zone*____ *State*_____

*Application I have in mind*_____

SOMETHING NEW HAS BEEN ADDED TO RUBBER

IMPROVES RUBBER QUALITY . . . LOWERS COST

Here's a new rubber antioxidant that does the work of many. And it does it economically.

Already on a multi-million pound production basis in the petroleum and plastics fields, "Ethyl" Antioxidant 702 now shows great promise for the rubber industry.

Tests prove that 702 is highly effective in a wide range of rubber products. Its applications include tires, shoe soles and heels, floor tile, coated fabrics, mechanical and household goods. Specifically, 702, a product of Ethyl's ortho-alkylation process, will: • *stabilize synthetic rubber polymers of the stereospecific, SBR and butyl types* • *stabilize oil-extended polymers* • *protect natural and SBR vulcanizates against oxidation.*

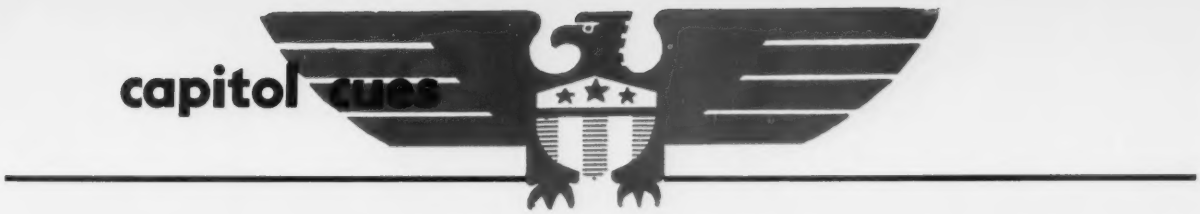
A relatively non-staining phenolic antioxidant, 702 is superior to competitive staining and non-staining types. It is efficient at low concentrations, therefore costs less to use. And . . . of interest to food packagers and handlers . . . it is non-toxic.

702, in short, offers rubber manufacturers a definite competitive edge for their products—improved rubber quality and lower costs.

Like more information and a sample? Call or write:

ETHYL CORPORATION, NEW YORK 17, N.Y. • TULSA • CHICAGO • HOUSTON • LOS ANGELES

ETHYL CORPORATION OF CANADA LIMITED, TORONTO • **ETHYL U.S.A. (EXPORT)** NEW YORK 17, N.Y.



FIRST FORECASTS FOR 1962 ARE FOR A YEAR OF BIG BOOM. Economists in government and industry are nearly unanimous in projecting rapidly expanding sales and profits. To begin with, they are deeply impressed by the bounce the economy showed during the Spring and Summer--gains that far outstripped expectations. In addition, several factors will be adding new momentum.

The experts see powerful new lift coming from three sources:
-Government spending is rising by billions--for defense, for foreign aid, and for welfare programs. These outlays will have to be financed by a deficit...potentially inflationary.
-Consumer purchasing is due to spurt as jobs and wages rise. Sales don't usually jump till months after an upturn starts.
-Business investment in inventory and new plant will quickly respond to all the increased government and consumer demand.
With these "ingredients" present, booms almost always follow.

BUSINESS ACTIVITY IS EXPECTED TO RISE 8% to 9%, over-all, next year. (That will be above and beyond the record rate that will be reached at the close of 1961.) This year, the Gross National Product--the best and most comprehensive measure of economic output--will hit a whopping $518 billion. Next year, the total will make a huge leap--to an estimated $565 billion.

Here's what's ahead for key economic indicators in 1962:
-Factory output: Gains will average 10%--more for hard goods.
-Consumer durables: Auto and appliance sales will rise 15%. A near-record 7 million new cars will be sold--maybe more.
-New home starts: Industry will build 125,000-150,000 more.
-Incomes: More folks working at higher wages will lift buying power 6%--solid gains, too, since prices will rise only 1%.

THE BOOM THAT'S DEVELOPING WILL CUT UNEMPLOYMENT, but won't solve the problem entirely. Productivity is rising as it always does early in a recovery; a few extra workers can turn out a lot more goods. At the same time, 1 million-plus new workers will be entering the labor force. Thus, even a sharp recovery will only cut the number of jobless from the current 6.8% of the labor force to 6% by year end and to 4½-5% by the end of 1962.

The job gains that will materialize later this year and next will be most numerous in steel, autos, ordnance, machinery, food processing, retailing, construction, and many services. This will still leave a growing group of workers for whom jobs are scarce. Currently, half the idle have been jobless for 15 weeks--another 500,000, for more than a half year.

CORPORATE PROFITS HAVE ALREADY BEGUN TO RISE from the low level of the first quarter. In the second quarter, earnings nearly matched those of a year ago--a good period generally. As usual, the picture was spotty. On the plus side were the aircraft, finance, food, oil, office equipment, and utilities industries. Declines from 1960 came in auto equipment, chemicals, electrical equipment, steel, paper, textiles and apparel, and the railroads.

capitol cues (cont'd)

INDUSTRY WILL SHARPLY EXPAND ITS CAPITAL EXPENDITURES over the next year or so, to make big profits gains possible. Many economists are taking the line that investment in new facilities offers the only real hope of ever widening present thin profit margins. Political pressure makes it harder to raise prices, but labor costs keep moving up. The most promising way out of the squeeze is to lift productivity--which boils down to better equipment.

> The increase in the minimum wage that took effect on Labor Day is adding more than $500 million to payrolls directly and many times this indirectly. The indirect impact is expected to show in the pressure for wage increases from higher paid workers determined to protect existing differences in rates.

GET SET FOR SOME INCREASES IN WHOLESALE PRICES this Fall, despite government resistance. Some gains are inevitable as output gets closer to capacity; many firms will feel more free to pass on increased wage costs--those absorbed in the past because of competition plus those on the horizon. In many cases, higher productivity alone cannot pay for higher labor costs.

> The bellwether for wholesale prices may be steel. Last year's steel contract calls for further increases this Fall that have been estimated at 12¢ or 13¢ an hour. Industry officials do not see how they can absorb all this. This is why talk of hikes in selected items persists, despite the expressions of disapproval that have been voiced by Congressmen and by the White House. Of course, increases in prices that steel-users must pay may have to be passed on by the users to consumers.

WASHINGTON IS CRACKING DOWN ON IDENTICAL BIDDING on U.S. contracts. Scrutiny of reported cases is being tightened--with much fanfare--in hopes offenders will get the point. Even more important, instances of identical quotations on contracts over $10,000 are being turned over to the Justice Department. Little sympathy is being given to arguments that similar bids --often alike to three decimal places--reflect efforts to meet competition.

> Officials concede that the legal action they can take isn't very potent. They must show conspiracy to get a conviction, and that's hard to show. So they rely on publicity instead.

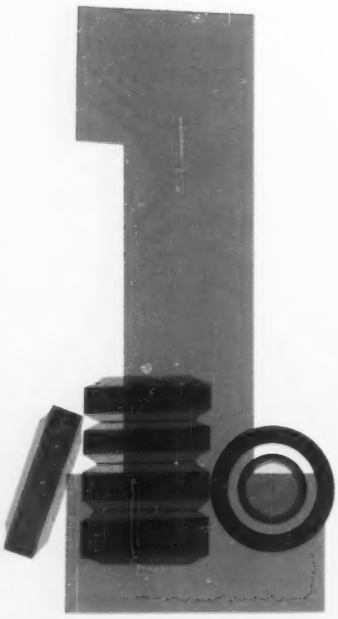
TIGHTER MONEY IS ON THE WAY. It will be a result of action by the Federal Reserve. At first, the steps to be taken will be extremely mild--and their effects hard to see. The Reserve System will simply be making a little less new credit available for the Fall season than it would normally be supplying to the country's commercial banks at this time of the year.

> Before long, here's what will happen to interest rates:
> -Short-term rates will firm slightly in months ahead. But the chief impact at the banks will show up as a slightly greater degree of choosiness...downgrading credit risks.
> -Long-term rates will move up--maybe even a bit faster. The Treasury, local governments, and many corporations will be in the market to raise huge sums by selling securities.
> To repeat: The tightening will be mild for several months. It will be mid-1962 before credit becomes really stringent.

MOST FINELY DISPERSED **CARBON BLACK** MASTERBATCH AVAILABLE

Before the Micro-Black process even begins, particles of carbon black are pulverized and ground to extremely small size—called "smoke". Then, in a series of mixing jets, the carbon black slurry, oil, and latex are mixed in a high shear agitation process. Velocity of the liquid stream at the nozzles actually reaches hundreds of miles per hour. The result is the most finely dispersed carbon black masterbatch available.

3 WAYS YOU SAVE WITH AMERIPOL MICRO-BLACK



IMPROVED PRODUCT QUALITY . . . carbon black is the best reinforcing agent—and the better the dispersion, the more carbon black contributes strength and resistance to wear. MICRO-BLACK's fine dispersion gives you the ultimate in quality and performance.

STREAMLINED STORAGE . . . Micro-Black is packaged for easy, fast handling, and eliminates the cost of in-plant storage of carbon black.

FASTER PRODUCTION . . . Micro-Black comes to you with latex and carbon already precisely mixed. This eliminates time-consuming weighing and milling operations, and shortens mixing time. And clean-up time between runs is reduced.

NEW OIL-EXTENDED AMERIPOL 4771 CUTS COSTS;

provides wide range of physicals with selective compounding

Ameripol 4771 is a new non-staining Micro-Black Masterbatch with 50-part oil extension for economy. Added oil makes a softer stock, with little sacrifice in tensile strength. 4771 reduces mixing costs and permits increased loading.

As with all Micro-Black Masterbatches, superior physical properties are obtained by the use of high shear agitation of the polymer, oil, and carbon black, followed by immediate coagulation.

A series of tests with different compounds based on Ameripol 4771 shows how you can economize on your inventory by using such a versatile Micro-Black. A wide range of hardness (frequently an important property in mechanical goods operation) can be obtained with selective compounding of Ameripol 4771. This permits carrying fewer compounds in stock to meet most major requirements.

In the test recipes listed here, a series of stocks of different hardness are all based on Ameripol 4771. Hardness can be increased or decreased as desired by varying the amount of filler and/or softener to the base compound. The recipes shown vary in Durometer hardness from 35 to 94, and intermediate values can be obtained by blending.

It is believed that the work to date has given sufficient information to serve as a guide for conducting detailed application studies. In the low-cost, highly mineral-filled formulations it may be necessary to adjust the acceleration to compensate for the retarding effect of the clay.

RECIPES OF DIFFERENT HARDNESS BASED ON AMERIPOL 4771

	A	B	C	D	E
Ameripol 4771	150.00	150.00	150.00	150.00	150.00
Zinc Oxide	4.00	4.00	4.00	4.00	4.00
Stearic Acid	1.00	1.00	1.00	1.00	1.00
Dixie Clay	—	100.00	100.00	100.00	100.00
Goodrite 2007	—	—	—	—	20.00
Agerite Resin D	0.75	0.75	0.75	0.75	0.75
Sun Anti-chek	0.75	0.75	0.75	0.75	0.75
#210 Brown Sub	30.00	30.00	15.00	—	—
Paraflux #2016	15.00	15.00	7.50	—	—
Circosol 2XH	15.00	15.00	7.50	—	—
Santocure	1.00	1.00	1.00	1.00	1.00
Cumate	0.10	0.10	0.10	0.10	0.10
Sulfur	2.00	2.00	2.00	2.00	2.00
TOTAL	219.60	319.60	289.60	259.60	279.60

PHYSICAL PROPERTIES OF TEST RECIPES

	Cure, Min. at 307°F	A	B	C	D	E
Tensile, psi	5	1305	590	1135	1310	1305
	10	1430	950	1460	1590	1555
	20	1495	1130	1535	1695	1610
Elongation, %	5	875	880	705	495	455
	10	770	800	595	415	390
	20	705	715	535	350	330
Durometer Shore A	5	33	51	60	78	90
	10	34	53	64	79	93
	20	35	54	65	80	94
Comp. Set, Method B	20'/ 320°F	41.0	61.2	46.8	39.6	42.1
Specific Gravity		1.11	1.35	1.39	1.48	1.45

Goodrich-Gulf Chemicals, Inc.

WORLD'S LARGEST SOURCE OF SYNTHETIC RUBBER

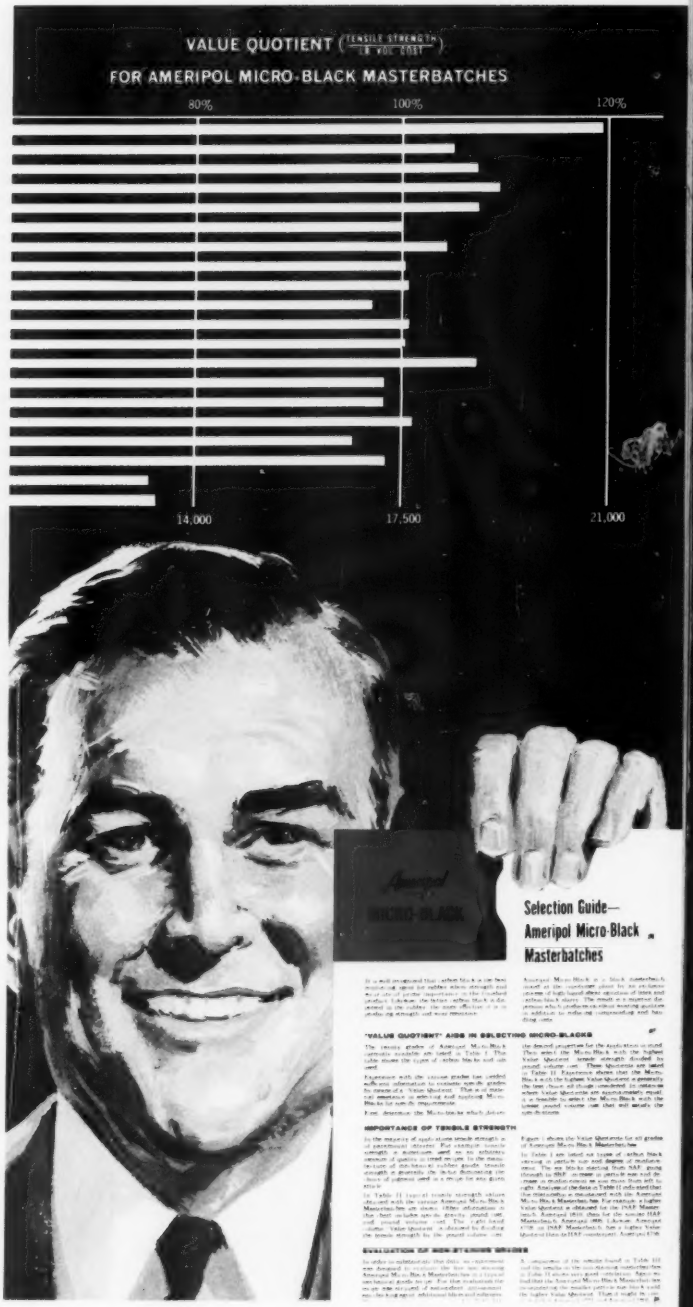
NOW... 20 MICRO-BLACK MASTERBATCHES OFFER A WIDE SELECTION OF PROPERTIES

With twenty grades of Ameripol Micro-Black now available, you can precisely select the combination of properties and costs that meet your requirements. And experience with the various grades have yielded enough data to provide an accurate selection guide.

A new bulletin "Selection Guide to Ameripol Micro-Black Masterbatches" gives complete data and lists "Value Quotients" for the various grades.

A chart contained in this Selection Guide plots various tensile strengths (often a matter of prime interest) and pound volume cost. Use of the "Value Quotient" gives you an easy method of evaluating and selecting the masterbatch you need.

For your copy, write Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland 14, Ohio.



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hughson CHEMLOK®

ADHESIVE DATA

UP-TO-DATE INFORMATION ON SPECIAL-PURPOSE ADHESIVES FOR INDUSTRY

WHY CHEMLOK ADHESIVES LEAD

From a standing start in 1956, Chemlok Adhesives have become the most widely used rubber-to-metal adhesives in the world. There are clear-cut reasons for this quick acceptance of Chemlok 220 and 203.

Only Chemlok Adhesives bond the entire spectrum of commercial elastomers. Only Chemlok Adhesives offer all these performance advantages:

Versatility: One adhesive system bonds natural rubber, GR-S, butyl, neoprene and Buna N to all metals and many rigid plastics.

Wide Manufacturing Tolerances: Bonding is simplified by the wide latitude permissible in compounding, surface preparation, adhesive application, metal parts handling and molding technique.

Environmental Resistance: Maximum resistance to heat, hot and cold water, salt spray, chemicals, oil, solvents and corrosive atmospheres is obtained by use of Chemlok 203 and 220.

One-Coat Application: A single coat of Chemlok 220 outperforms most conventional two-coat systems, and has equivalent environmental resistance.

HOW CHEMLOK ADHESIVES CAN SAVE YOU MONEY

One coat — less adhesive, less labor, shorter cure time.

One adhesive — avoids errors, simplifies inventory and application problems.

Less scrap — one firm cut scrap losses from poor bond 96%!

Easier processing — broad tolerances permit variations in elastomers, techniques, conditions.

NEW DEVELOPMENTS

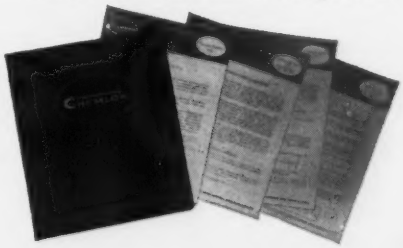
Among the experimental adhesives now available for evaluation are:

- Adhesive EX-B150-1 permits heat bonding of dissimilar unvulcanized elastomers. It is the first to provide successful rubber-to-rubber bonds between elastomer combinations previously thought impossible to join, particularly where one is based on butyl. Typical applications include conveyor belt covers to bodies, wire and cable jackets to insulation, hose covers, roll covers and multilayer gloves.
- Adhesive EX-B579-1 bonds RTV (room temperature vulcanizing) silicone rubbers to metals, glass, ceramics, plastics and fabrics. One-part, one-coat, nonstaining adhesive provides bonding during the room temperature cure. It meets electronics industry standards, offers excellent environmental resistance to broad temperature conditions.

TECHNICAL LITERATURE

A letterhead request will bring you any of the following:

Technical Bulletin 2012 **"Chemlok Rubber-to-metal Adhesives"** presents comprehensive information on Chemlok 220 and 203.



Technical Bulletin 7101 **"Preparation of Substrates for Bonding"** is a valuable guide to proper surface preparation procedures.

"Some Fundamental Aspects of the Problem of Rubber-to-metal Adhesion" is the title of a technical article reprint which examines theoretical considerations in bonding.

Product bulletins and samples are available on all Chemlok Adhesives—standard, special, experimental. Please define your application area.

SPECIAL-PURPOSE PRODUCTS

Specialty Elastomer Adhesives: Silicone rubber, Viton A, Hypalon and other specialty elastomers are successfully bonded to metals, fabrics and other materials with Chemlok 607.

Surface Treatments: Chemlok Surface Treatments for aluminum are now available. Research is being conducted on Chemical Surface Treatments for metals to enhance their adhesion to organic materials.

Experimental Adhesives: Unique products are now being sampled or are under development which will create design opportunities now impractical because of inadequacy of existing adhesive products.

If you would like information regarding our progress in any of these fields, please write us.

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HUGHSON CHEMICAL COMPANY
Division of Lord Manufacturing Company
Green Garden at 12th • Erie, Pennsylvania

Reliable, Consistent Test Results With . . .

OREC 0300 *Automatically Controlled Ozone Test Chambers*

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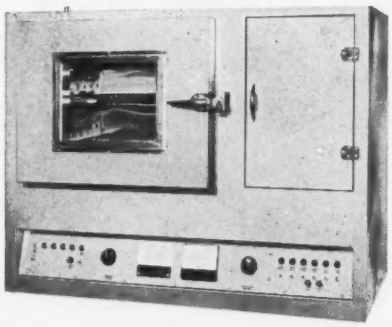
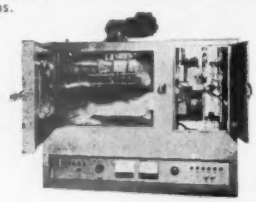


Orec 0300 Series employ an *electronic-chemical loop feed back servo system to achieve and precisely maintain chamber ozone concentrations.



Orec 0300 with Dynamic Stretching Apparatus.
* *patent pending*

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ACE

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AMERICAN HARD RUBBER COMPANY

ACE ROAD, BUTLER, N. J. • PHONE: TERMINAL 8-1000 • PLANTS IN BUTLER, N. J., AND TALLAPOOSA, GA.

Combined rubber processing experience of former Pequanoc Rubber Co. and American Hard Rubber Co. available to supply your custom compound requirements.

EXPERT TECHNICAL ASSISTANCE

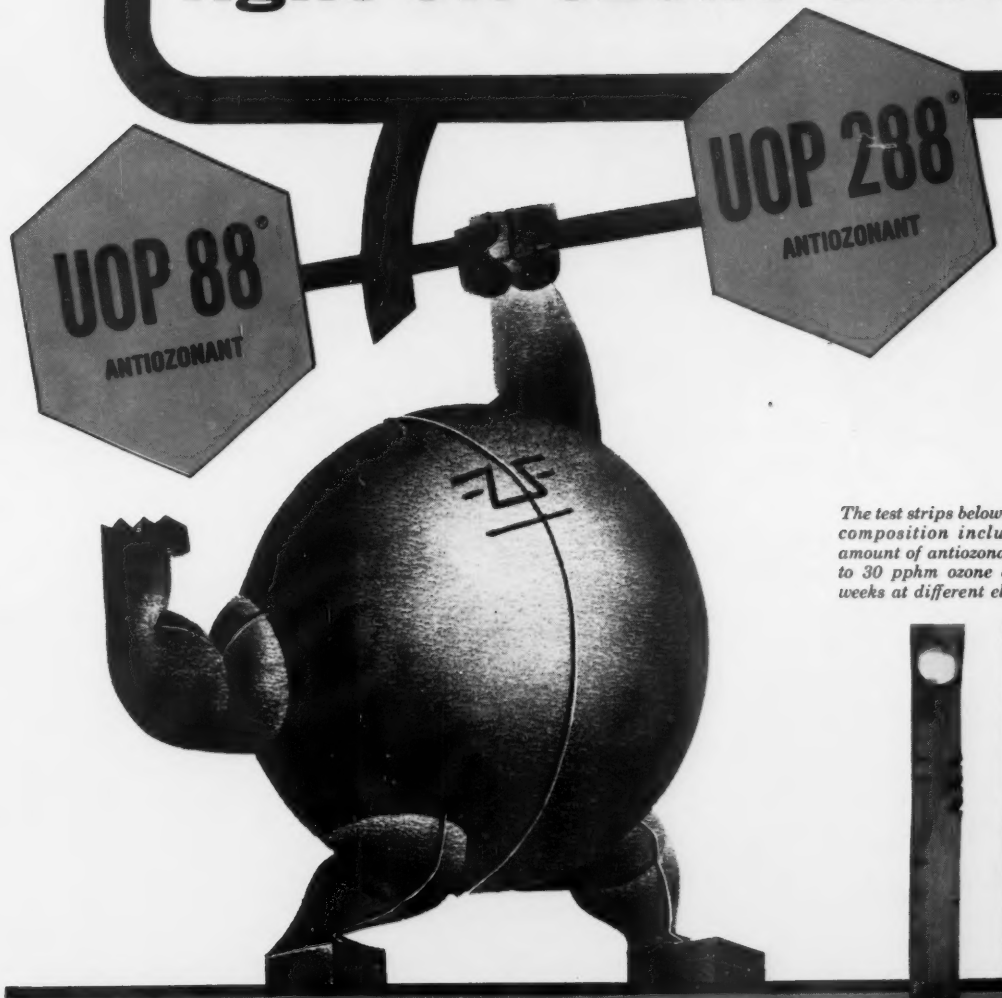
BANBURY AND MILL FACILITIES

TOP QUALITY AND UNIFORMITY

ACCURATE LABORATORY AND PRODUCTION CONTROL

ALL GRADES OF SOFT AND HARD RUBBER

how can rubber under STRESS fight off ozone attack?



The test strips below, both of identical composition including kind and amount of antiozonant, were exposed to 30 pphm ozone at 100° F for 2 weeks at different elongations.

The specimen on left, subjected to 20 percent elongation, shows severe ozone cracking.

Specimen at right, subjected to 10 percent elongation, shows no sign of ozone cracking.

Properly formulated, rubber can withstand ozone, even under severe dynamic service...

What happens to a well formulated rubber compound when the vulcanized product is subjected to inherent or applied stresses? Ozone attacks the surface of the product and severe cracks develop.

Hence the need for special ozone protection provided by UOP 88 and 288. Unlike other protective measures, UOP antiozonants extend their protection to products under heavy physical stress and dynamic flexing. With a relatively small increase in amount, you can give your product sufficient ozone protection to withstand greatly increased stresses.

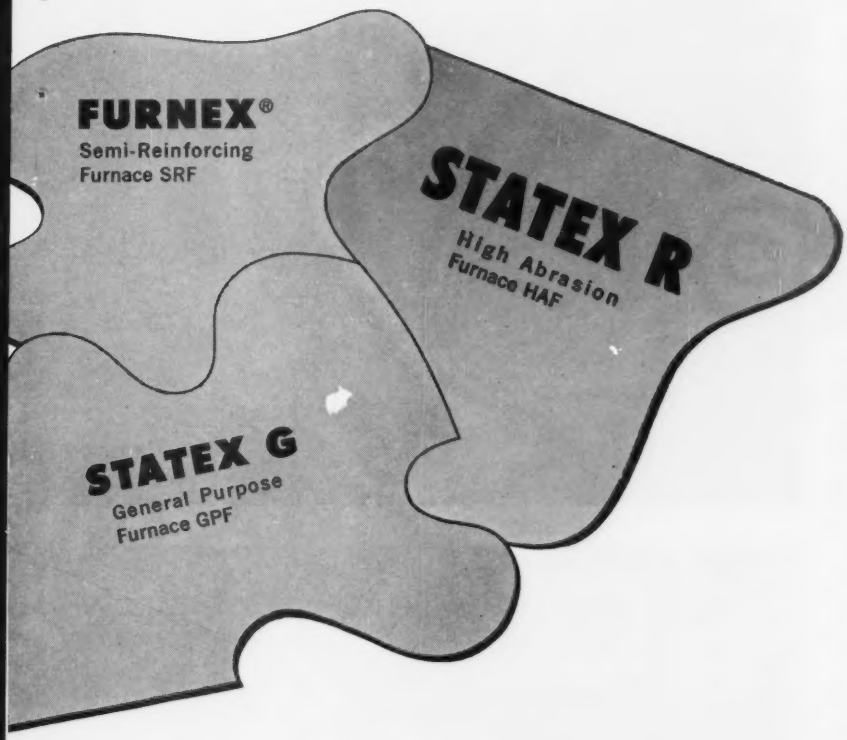
In working out rubber formulations involving the use of antiozonants avail yourself of UOP technical service and facilities. Just write or telephone our Products Department.

UOP®

UNIVERSAL OIL PRODUCTS COMPANY

30 Algonquin Road,
Des Plaines, Illinois, U. S. A.

STATEX 125
Intermediate Super Abrasion Furnace ISAF
NEOTEX® 100
NEOTEX 130
NEOTEX 150
...standard for low modulus oil furnace blacks
STANDARD MICRONEX®
Medium Processing Channel MPC
STATEX® 160
Super Abrasion Furnace SAF
STATEX M
Fast Extruding Furnace FEF
MICRONEX W6
Easy Processing Channel EPC
STATEX B
Fine Furnace FF
STATEX 93
High Modulus Furnace HMF



COLUMBIAN has a carbon black to fit your every rubber need!

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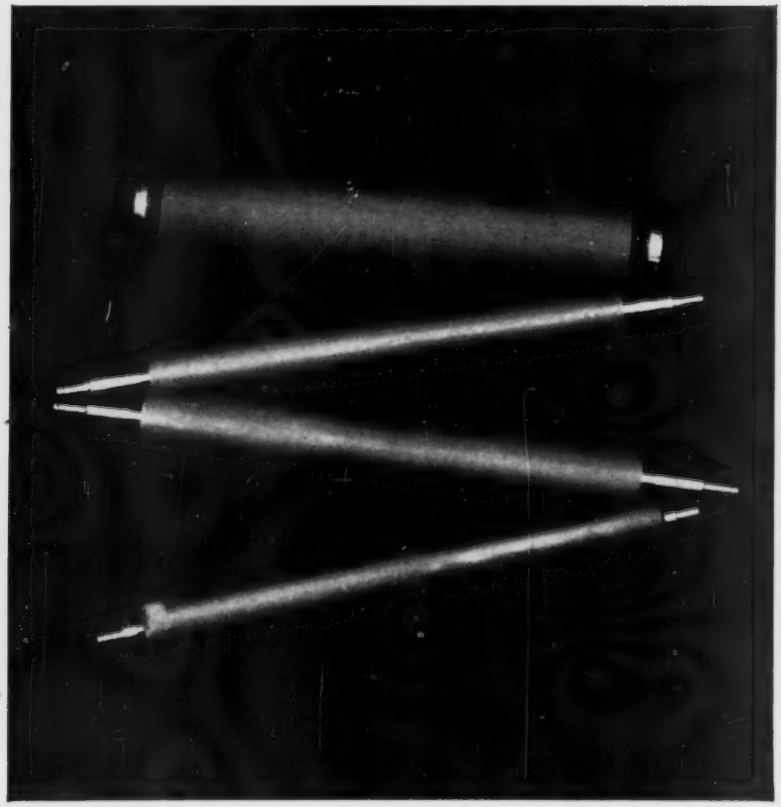

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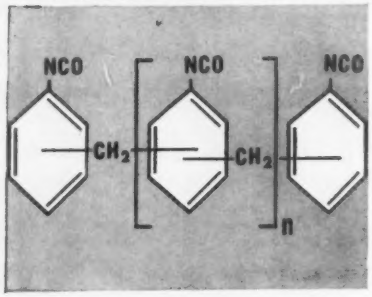

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Names in the News

James McWhirter, general manager of the Industrial Chemicals Division of Pennsalt Chemicals Corp., Philadelphia, Penna., has been elected a vice-president of the company.

Donald M. Mahady, formerly New York City district manager for the Boston Woven Hose & Rubber Division of the American Biltrite Rubber Co., Cambridge, Mass., has been appointed belting product manager of the division.

John H. Peterson, formerly assistant sales manager of the Tire Valve Division of the Bridgeport Brass Co., Bridgeport, Conn., has been promoted to sales manager of the division.

William H. McKenzie, in charge of engineered automotive products sales for the Goodyear Tire & Rubber Co., Akron, Ohio, has been honored for completing 45 years of service with the company.

Melvin P. Hershey has been appointed manager of tire engineering, **A. F. Weber** has been named manager of highway truck tire engineering, and **R. C. Shipman** has been made manager of off-the-road tire engineering for the Firestone Tire & Rubber Co., Akron, Ohio.

John J. Hall, pioneer in traffic safety programs, has retired as director of the Esso Safety Foundation, New York, N. Y.

Robert B. Fulton, formerly manager of the Orange, Calif., plant of Anaconda Wire & Cable Co., has been elected president of the Sequoia Wire and Cable Co.

Lawrence T. Peifer, formerly director of business and development, has been named executive vice-president of the Sports Division of the Brunswick Corp., Chicago, Ill. He is succeeded by **Robert W. Lutticken,** a corporate vice-president.

Dr. Douglas O. Geymer and **Kenneth W. Wood** have joined the staff of the Emeryville, Calif., Research Center of Shell Development Co. as chemist in the General Chemistry Department, and engineer in the Project Development-Industrial Chemicals Department, respectively.

John N. Brewster, formerly manager of petroleum sales for the B. F. Goodrich Co., has been appointed sales manager of B. F. Goodrich Australia Pty., Ltd., Melbourne, Australia.

Charles H. Zimmerman, manager of airplane wheel and brake production and engineering at Goodyear Aircraft Corp., Akron, Ohio, has retired after 44 years' service with the company.

Robert M. Stroker, formerly general sales manager of the Automotive Division of the Collins & Aikman Corp., New York, N. Y., has been named general manager of the division, and has also been elected a member of the board.

Simon Askin, chief executive officer and director of Heyden Newport Chemical Corp., New York, N. Y., has been elected president of the Armed Forces Chemical Association.

Dr. Roger M. Nagel, formerly group leader in the Polyolefin Research Department of the Food Machinery & Chemical Corp., Princeton, N. J., has been named supervisor of polyolefin development for the Petro-Tex Chemical Corp., jointly owned by FMG and the Tennessee Gas Transmission Co.

Dr. C. L. Raymond, manager of chemical research and development at the Shell Development Co., Emeryville, Calif., has accepted a senior position with an associated Shell company in The Netherlands.

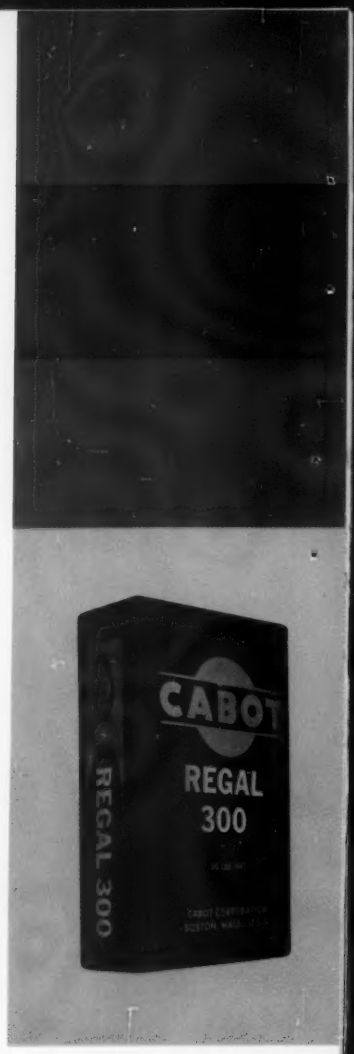
J. G. Affleck, manager of the Rubber Chemicals Department at the American Cyanamid Co., Bound Brook, N. J., has been elected president of the Commercial Chemical Development Association.

Dr. Edwin S. Gould, formerly associated with the Stanford Research Institute, has joined the Shell Development Co., Emeryville, Calif., as a chemist in the Petroleum Chemistry Department.

Dr. Walter H. C. Rueggeberg, director of research and development, has been elected a vice-president of Atlas Chemical Industries, Inc., Wilmington, Del.

Regal® 300 can save you $500 per carload!

THE FIRST CHANNEL REPLACEMENT FURNACE BLACK



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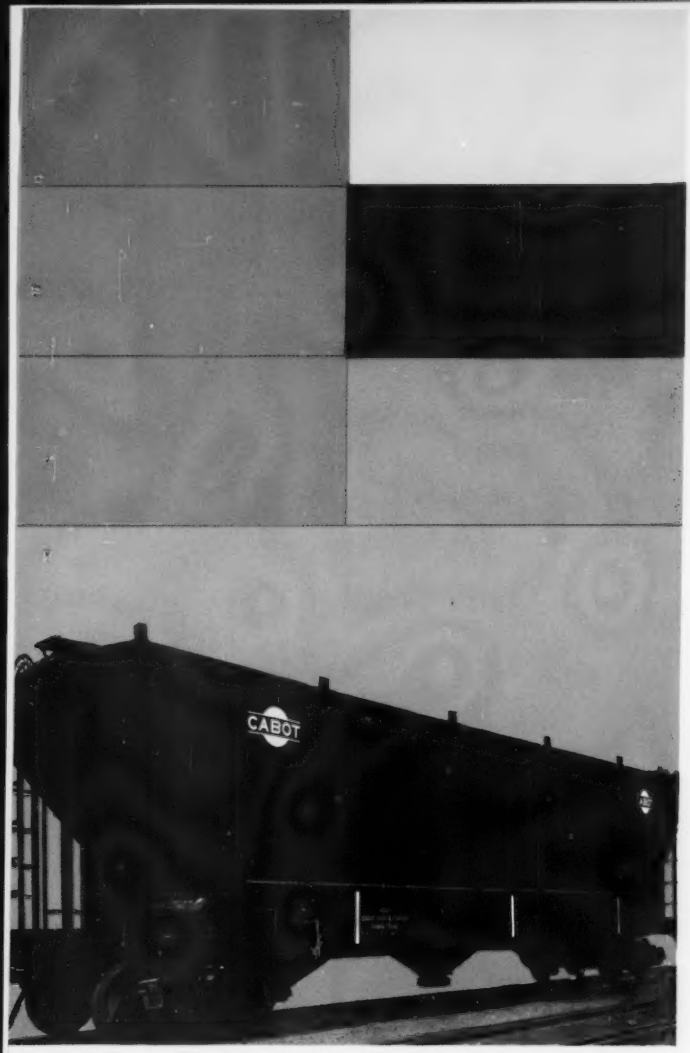

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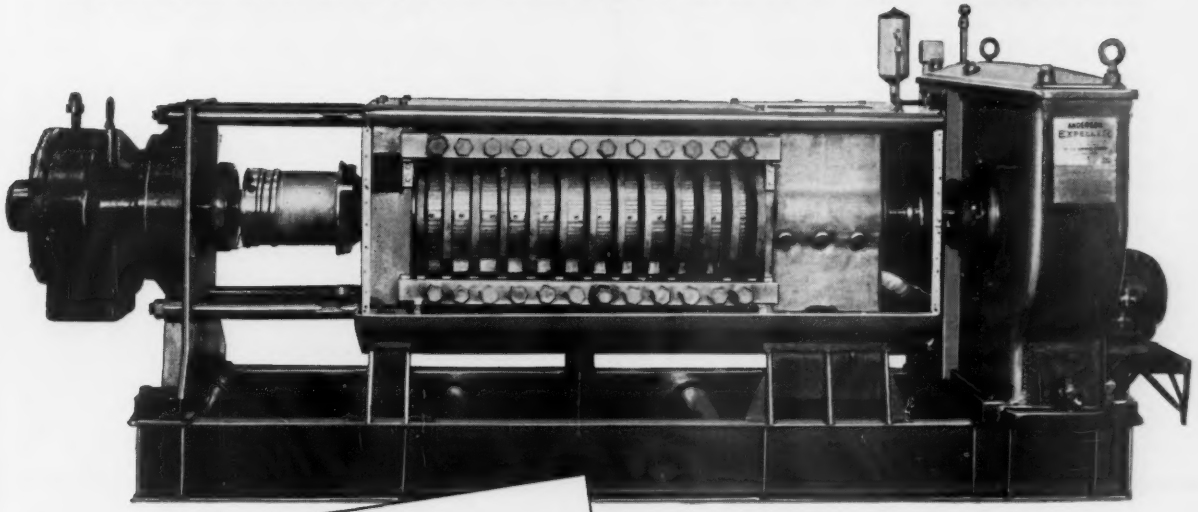
PROGRESS REPORT

ON MECHANICAL DEWATERING OF RUBBER



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Oil Extended	12-17	5000	8000
Carbon Black Masterbatch	8-12	7000	9000-10,000

	% H_2O IN	% H_2O OUT	Expeller Capacity
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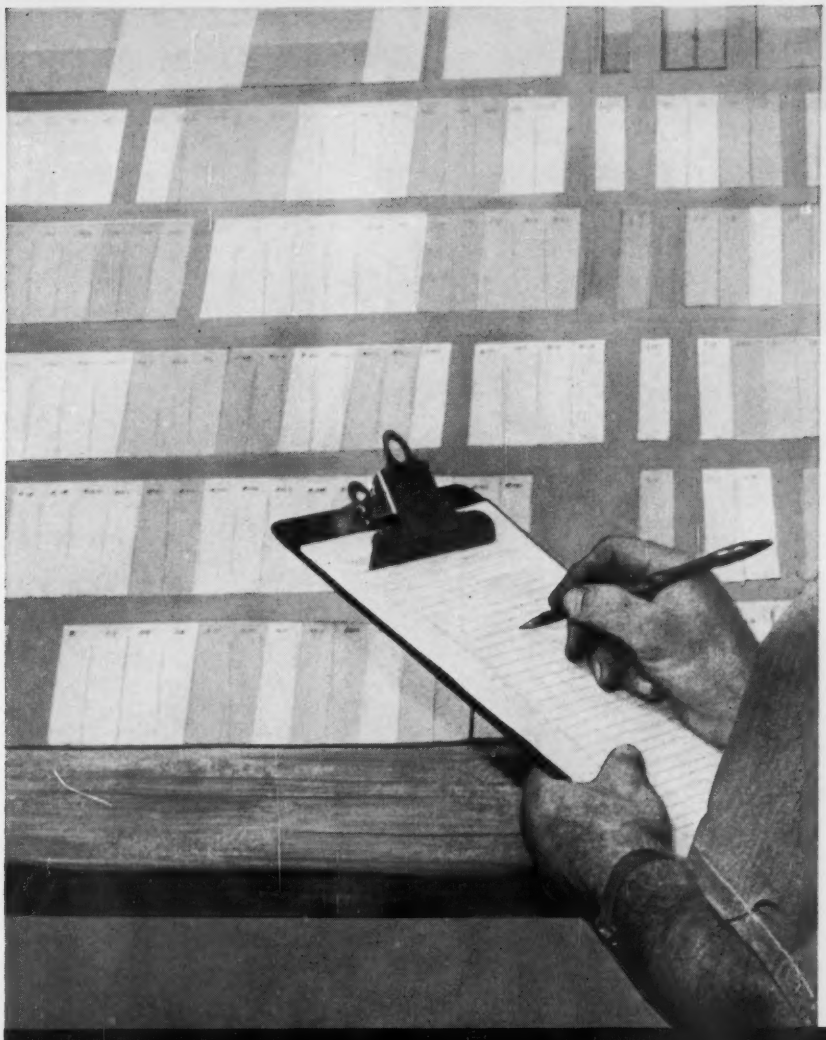

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As Ken Soule Sees It

by Kenneth J. Soule

Zippers

The slide fastener, commonly called the "zipper," has become such an intimate and commonplace part of our daily lives, that it is generally taken for granted. This is in spite of the fact that this *simple* gadget is considered by experts to be one of the most complicated and ingenious inventions of the past century.

The zipper, as we know it today, has had a long and stormy history. Leslie Lieber, in an interesting and informative story in *This Week* magazine, highlights the ups and downs of its development. It all started on August 29, 1893, when an inventor named Whitcomb L. Judson was granted a patent on a "locker or unlocker for automatically engaging or disengaging an entire series of clasps by an single continuous movement."

Later that same year, Mr. Judson exhibited his device at the Chicago Columbian Exposition, where it came to the attention of Colonel Lewis Walker, a company lawyer from Meadville, Penna. He was much impressed with the fastener, and set up the Universal Fastening Co. to promote it. Unfortunately, the inventor was unable to produce a consistently workable product, although Colonel Walker is said to have invested more than a million dollars in the venture. The Colonel, however, was obviously not one to give up easily. In June, 1905, his company, (now known as the Automatic Hook and Eye Co., of Hoboken, N. J.), introduced their so-called, "C-Curity fastener for use on ladies' garments. This also proved disastrous, since the fastener seemed to have a tendency to zip off pieces of tender flesh while it was being operated.

Some nine years later, 1914, zippers finally became commercially practical. This came about due to the development by Gideon Sundback, a Swedish engineer, of an efficient slide fastener and a machine for its mass production. (It seems eminently fitting that the two sons of Colonel Walker handled the production and sale of the successful closure, since the family had struggled so long to prove that it was not an idle dream.)

From that point, the still unnamed zipper pushed steadily along, with major assists from several specialized applications. The first was its use in 1917 on money belts; another, the same year, saw the U.S. Navy order some 10,000 units for use in "'windproof" flying suits. The third, in 1922, brought the rubber industry into the act, when Frederick H. Martin, a footwear designer for B. F. Goodrich, suggested putting "sliders" on the company's galoshes. Betram Work, Goodrich president, agreed wholeheartedly, and also coined the word "zipper" as a name for the new Goodrich overshoe. The public response, according to Mr. Lieber, was "terrific" and zipper sales skyrocketed. Finally, in 1924, the Prince of Wales started wearing trousers with zippers. This is said to have brought on the greatest sales boom in zipper history.

From that time on, zippers really zoomed ahead! This was particularly true in World War II, when the U. S. Army put zippers on all manner of G.I. clothing and equipment. It is claimed that Stalin was so jealous of this lavish zipper display that at the first chance he latched onto the biggest zipper factory in Germany, had it dismantled and shipped to Russia.

Later on, it must have been decided that other war loot, such as German rocket and missile plants, would really be much more useful to the Russian people than a handy consumer item like zippers. After all, why consider human needs or desires when outer space is *begging* to be Sovietized?

Electronics

Probably a very minute percentage of our adult population understands or could explain the electron theory upon which the science of electronics is based. Nevertheless, the public *is* well aware of many of the electronic wonders which have been developed over the comparatively recent past. These would include X-ray equipment, radio, power packs, photo-electric tubes, electron microscope, and TV, to name a few, and, of course, earth-circling satellites, collecting and reporting all manner of vital data.

Although much of the publicity regarding many of these electronic devices has been on military applications—particularly in the last ten years or so—there are many everyday, peacetime uses which are of vast interest and importance. Donald I. Rogers, Financial Editor of the *New York Herald Tribune*, discusses several of these in a recent column. The items covered all concern developments worked out and perfected in Canada. As Mr. Rogers sees it, the Canadians have placed their emphasis on developing the constructive, humanitarian uses of electronics, rather than destructive or military applications, as is done in this country.

The *modus operandi* in Canada is for the National Research Council and the country's leading scien-

tists, such as Edgar Sharpe of Sharpe Instruments, to work on the basic idea and decide what programs are worth pursuing. The choosen ones are then turned over to private firms for more study and possible development. One of the chief Canadian companies participating in this co-operative effort is Sharpe Instruments, Ltd. of Toronto. It has been unusually successful in perfecting a number of "humanitarian electronic devices," which have been found to have almost unlimited potential in a wide range of applications.

One of the devices developed by Sharpe is an experimental stereophonic stethoscope which is said to revolutionize detection and diagnosis of several diseases. Another is an extremely delicate earphone which, for the wearer, entirely blocks out all outside noises, and at the same time reproduces music —or other wanted sounds—with unequalled clarity and fidelity. In the course of the study involved in the development of this earphone, it was discovered that certain sounds can render the human brain oblivious to other feeling or sensations. As a result, it is reported that women who are allergic to anesthetics are undergoing child birth in Toronto's Branson Hospital without pain, while listening to music through Sharpe Co. earphones. Major surgical operations are also said to be taking place at the same hospital—in a similar way.

A related device, developed at the request of the National Research Council, transmits sounds to completely deaf children, and also enables them, after a time, to talk intelligibly. Thus, at the "worlds most progressive school" for the education of muted, deaf children, (located at Bellville, Ontario), 600 such youngsters are receiving *normal* educations. Eventually they will be able to achieve the miracle of becoming self-supporting.

As Mr. Rogers fittingly points out, it is particularly appropriate that this wonderful work to lessen the hardships of deafness should come to such a successful finish in the same area where Alexander Graham Bell did much of his early work! One primary purpose of Mr. Bell's work was to find some way to help his deaf wife to hear. This was unsuccessful, but the study led to his invention of the telephone which, much later of course, provided the ground work for *all* subsequent hearing aid devices.

It's In The Bag

The first step was taken recently which might ultimately lead to a small-sized nibble's being chewed out of one of the government's gargantuan stockpiles. This in itself is worthy of note but, when we find that the material involved consists of feathers and down, the item gains added interest.

As explained by Robert C. Toth in the *New York Herald Tribune,* there is, at present, a world shortage of goose, swan and duck feathers. Communist China had previously been the largest supplier, but it was noted that "curtailment of this source of supply has greatly increased the demand from other sources." Formosa, as the free world's largest exporter, while contracting to supply five million pounds of feathers in 1961, only has a production of three million pounds.

In the face of this critical shortage, it is doubly fortunate that we have a surplus of this grade of feathers in our stockpile of strategic materials, and that our General Services Administration would be glad to sell two million pounds of it. Normally, a six month's waiting period must elapse between the time the GSA advertises a material as being available and the actual sale. Since all the government agencies involved — Office of Civil and Defense Mobilization, and the Departments of State, Interior, and Commerce—have approved the sale, however, the House of Representatives has approved a bill granting *immediate* sale of this particular lot of merchandise. If the Senate concurs, and if the President approves, the two-million pound job lot should soon be winging on its way. Incidentally, the GSA is reportedly expecting to receive eight million dollars for the job lot, which would be "more than the government paid for the feathers in 1951-54."

The explanation given for the fact that our feathers happen to have become surplus, is that U.S. Army scientists have developed a method of treating ordinary domestic chicken feathers so that they are a satisfactory substitute for water fowl feathers in sleeping bags. This sounds like a worthy achievement—truly a feather in the Army's cap.

However, a non-expert on the subject wonders why sponge rubber in one form or another would not be an ideal material with which to replace *all* kinds of feathers in sleeping bag construction?

Bugs, Beware!

The latest weapon in the U.S. Army's continuing battle against its insect enemies is the "meta isomer of diethyl-toluamide," non-technically called "Deet-Deet." It is said to be greaseless and to possess a "relatively pleasant smell," as well as to repel most insects, including mosquitoes, flees, chiggers, ticks, deerflies, and biting gnats. Neither heavy rains nor extreme heat reduce its effectiveness!

If this gook actually works out, wise-cracking reporters, watching GI's in Southern camps getting ready to go on field maneuvers, may well say (with apologies to Duffy's Tavern), "Here is where the elite really meet to Deet."

How can we help you make better rubber-base adhesives?

Making any of the adhesives in this picture? Then you'll be interested in the property control you can get with Durez phenolic resins as ingredients of your adhesives.

For an example, take hardness (or softness) in a nitrile rubber solvent cement. You can vary this important film property to the exact degree you want, just by varying the rubber-to-resin ratio. It's that simple.

Doing so, you end up with a nitrile-base thermosetting cement that cures at room temperature to a strong, permanent bond. (For a *very* strong bond, it can be cured at 250°F, but this is seldom necessary.) The bond resists heat and grows stronger, not weaker, with age.

Let's suppose you want to make an adhesive for bonding nitrile rubber—cured or uncured—to metal. There's a Durez resin that greatly simplifies this job. It gives strong bonds to copper, brass, aluminum, tin plate, steel, stainless steel—and even gives medium-good adhesion to zinc plate and galvanized steel.

Formulating neoprene or natural-rubber cements? Nitrile or high-styrene-butadiene latex adhesives? Again, Durez resins give you the same sort of property control, plus certain specific advantages we'll be glad to tell you about.

We do not make adhesives, but we can put 40 years of resin experience to work for you.

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HOOKER CHEMICAL CORPORATION

HOOKER CHEMICALS PLASTICS

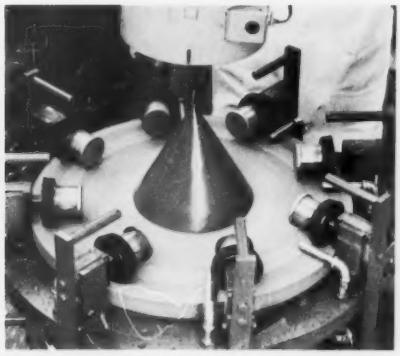
MEET FRED MYERS – United Carbon District Sales Manager and a man interested in tinkering with automobiles as a hobby.

With automobiles, servicing is one of the keys to better performance.

Service is also the key to top performance in the best interests of our customers.

SHIRTSLEEVE SERVICING

United Carbon maintains a complete, up-to-date service laboratory in Akron, Ohio. Its purpose is to help ensure that each of the company's masterbatches performs exactly as it should in applications for which tailored.



Each new masterbatch formulation made by United Carbon is put through a thorough series of tests to determine characteristics in practical applications. Pictured is an angle abrader, just one of over 50 pieces of modern testing equipment in the lab.

A black masterbatch is only as good as its performance—in processing and in final rubber product use. United Carbon provides its customers this performance assurance through work at its Akron Service Laboratory.

Every year many hundreds of tests are run on the company's BAYTOWN black masterbatches to determine both processing characteristics and end-use durability. No masterbatch formulation is released to a customer until it has proven itself under all conditions.

By insisting on rolling up its sleeves and providing this service, United Carbon has gained a stature second to none in the rubber industry.

BAYTOWN — The Birthplace of Black Masterbatch

For more information on BAYTOWN black masterbatch and service provided by the Akron Service Laboratory, contact:

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Chemical Manufacturers

No. 15

USERS REPORT STABILITE GIVES OUTSTANDING RESULTS AT LOWER COST

Unlike the majority of antioxidants, Stabilite shows a measurable beneficial effect on ozone resistance, as reported by a manufacturer of tires used on automotive farm equipment. In combination with a petroleum wax Stabilite further improved anti-checking properties. Another tire company in an airbag application uses 3¼ parts of Stabilite to 100 of rubber hydrocarbon. It obtains these beneficial results:

- **Better splicing due to Stabilite's plasticizing action.**
- **Better adhesion to metal valves.**
- **Better surface condition in use because Stabilite stays smooth longer.**
- **Reduction of circumferential cracking.**
- **Improved handling before curing.**
- **Lower cost.**

Still another tire manufacturer finds that Stabilite, used in the cushion stock containing natural rubber, produces excellent adhesion and shows less tendency for tires to lose their treads. This company credits Stabilite's peptizing action for the improved adhesion obtained. Stabilite added at the beginning of the mixing cycle of GR-S effectively reduces "nerve" and dryness, improves tack and prevents gel formation.

For further information and samples write: The C. P. Hall Co., Akron 8, Ohio, Exclusive distributors for Chemeco, Inc., manufacturers.

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• **Poland to Get $6 Million Acrylic Fiber Plant from Courtaulds, Ltd.** Equipment, "know-how" and a plant for production of acrylic fiber have been purchased by Poland from the English firm, Courtaulds, Ltd. The company reports that it won the contract in the face of stiff international competition—some of it from United States bidders. This is the fourth Red bloc contract for the firm in four years. In 1958 it won an $11.2 million Russian acetate yarn plant order, and in 1959 a $42 million omnibus order was signed by Moscow for plants for viscose tire cord, acrylic fibers, and acetate yarns. Last year, Courtaulds received a Yugoslav contract for a $5.6 million acrylic plant, presumably similar to the Polish order.

From Poland also comes word that anticipated production of SBR will reach 50,000 tons by 1965. The 1960 production, according to the Polish sources, was 20,000 tons. The first plant producing SBR under Soviet-Polish technical agreements is located at Oswiecim, a little town in South Central Poland (population 6,708) which non-Polish speaking Germans spelled Auschwitz.

Prior to World War II research work conducted by a group of Polish chemical engineers formed the basis for the Polish petrochemical and plastics industry. This was on a very small scale, however, and the factory was short-lived when the war broke out in 1939. Up to 1960, Poland had imported 16,000 tons of rubber annually.

• **Considerations in Rubber Reclaiming.** While roaming through the United Nations' Economic and Social Affairs library we came across a "technical report" written by Engineer Cornel Ghireoia of the Institute of Leather-Rubber Research in Bucharest, and published in a journal entitled *Roumanian Foreign Trade*.

The report, of work at the Jilava rubber complex at Bucharest where the process is in operation, states that the reclaiming method utilizes a neutral-aqueous process in conjunction with active swelling agents. The reclaiming process lasts for 1½ hours at 80° C., and then continues for 8 hours at 180° to 185° C. with continuous stirring. The water to soft rubber powder ratio is 1:2.5.

The author reports that the reclaim obtained is a homogeneous material "easily processed both in extruders and 'refiners.'" He adds that exports of the material, recently begun, have been delivered to the German Federal Republic (West Germany), United Arab Republic, and the Socialist Republic of Czechoslovakia.

• **Germany in Pakistan.** West German industry, which has been increasingly active in the international scene, has contracted with the Pakistan Investment Promotion Bureau to contribute: (1) $17.1 million toward construction of an acetate rayon yarn plant, and (2) $9.9 million for a polyethylene plant. The announcement, made by the Pakistan department, reported that the United States is also cooperating, with anticipated expenditures of $2.8 million for a tire factory and $4.7 million for a copper and aluminum cable factory being scheduled.

• **Euromarket Opinion.** A questionnaire prepared by the American Chamber of Commerce in France's Euromarket Committee (which is headed by James Goodson of Goodyear) probes some of the more revealing aspects of Euromarket participation. The questionnaire was printed in a recent copy of the organization's house organ; answers in confidence from members were invited. Among the questions:

What is the real purpose of Euromarket—economic, social, or political?

What problems does this development raise for your company?

What advice would you give to U.S. companies confronted with these problems? French companies?

Was your decision to manufacture in Europe chiefly prompted by:
- (a) difficulty for U.S. goods to compete in this market?
- (b) availability of locally accrued capital?
- (c) greater local acceptance due to domestic manufacture?
- (d) cheaper labor?
- (e) tax consideration?

What particular aspect of Euromarket is of special significance to your operations:
- (a) proposed anti-trust legislation?
- (b) the free movement of trade?
- (c) proposed tariff cuts?
- (d) equalization of male and female workers?
- (e) amortization of social legislation?

The questions themselves cast an interesting light on overseas operations by American firms. The answers would be even more interesting.

On the Continent (cont'd)

• **Red Bloc Imports from the U.S. Reduced.** In a Commerce Department report presented by Luther H. Hodges recently, it was announced that export licenses to Soviet Bloc countries dropped sharply. Licenses approved in the second quarter were down to $12.9 million from the first quarter's $23.8 million. The Department rejected another $2.8 million in applications, among them $200,000 worth of synthetic rubber. Shipment to East European Red satellites of boric acid, toulene, and technical data for a maleic anhydride plant and nylon 66 production was also denied.

• **England.** Reports from Washington recently seem to indicate a certain amount of re-thinking regarding the support of United States allies in waging the Cold War on the economic fronts. While the U.S. is cutting exports to Red Bloc countries (see above) of petrochemicals and related material data, the vast English firm, Imperial Chemicals, reported to its stockholders that ICI now sell more to Red Bloc countries than to the USA. The report came after a year in which their exports did not increase to either the USA or the English Commonwealth countries, but rose 25 per cent to the European Common Market, 25 per cent to the Outer Seven European countries, and 60 per cent to the Communists. It was stated at the ICI annual meeting that if this trend is expected to continue "a very large stake in Europe" will be taken by ICI in the future, regardless of whether Britain joins the Common Market.

Other companies in the United Kingdom have also become aware of the vast market that lies to the east. Export orders recently announced include a $4.2 million contract to supply two complete plants for filtration, drying, wrapping, and packing butyl synthetic rubber. Exports of natural rubber from the United Kingdom to Russia during the first five months of this year totalled 48.5 thousand tons. This compares with 10,251 tons during the previous year. On another front, a polystyrene and styrene monomer plant will be set up in Andhra Pradesh, India, by Bombay industrialists collaborating with BX Plastics, subsidiary of Forth Chemicals, Ltd., Monsanto House, London.

• **Austrian Production of Polypropylene.** Danubia Petrochemie A.G., an Austrian firm formed jointly by Montecatini of Milan, Italy, and Oesterreichische Stickstoffwerke A.G. of Linz, has begun production of polypropylene at Schwechat, near Vienna. The installation, with a capacity of 10,000,000 pounds per year, will be supplied by an adjacent refinery. Trade name of the polymer will be Daplen.

The installation makes Austria the fifth country in the world to produce the plastic, following Italy, Germany, the United States, and England. The Austrian chemical industry as a whole had a gross production value of about $400 million in 1960, compared with $340 million in 1959 according to the U.S. Embassy in Vienna. For the first time, the chemical industry surpassed the output of the textile industry and became the second largest industry in Austria. Most important increases over 1959 noted were in basic organic chemicals, plastics materials and products, rubber goods, and paints.

• **Rubber Products Overseas.** A firm in Northern Ireland has developed a new safety marker for road boundries. By coring rubber posts with a steel spiral spring, and reinforcing them at the base for mounting in concrete, the firm claims new safety for the careless driver, and less maintenance for road crews. Reflecting foil at the top of the post makes it clearly visible through fog and rain. On impact, the post will give way without damage to either post or car, then spring back to its original position. A number of these posts have been installed on a stretch of new road in Northern Ireland. Manufacturer is Hamilton Ltd., Belfast, N.I.

A desiccant which prevents porosity caused by the presence of moisture during the processing of both natural and synthetic rubber has been developed by John and E. Sturge Ltd. in conjunction with the Rubber and Plastics Research Association of Great Britain. The material, tradenamed Caloxol, is a 3:1 dispersion of calcium oxide in acid-refined mineral oil. The product, a thick paste which can be poured at room temperature, is reported to have a good storage life, without picking up atmospheric moisture. The material is used in proportions of 3-8 parts per 100 of rubber or polymer.

Midland Silicones Ltd., in an interesting piece of market and sales research, reports that 90 per cent of its total sales of silicone rubbers are accounted for by the principal grades, as opposed to special purpose, and that of these, nearly two-thirds have been developed within the last five years.

• **Chemical Exhibition Scheduled in France.** The sixth International Chemical Exhibition, being held just outside Paris April 25 to May 4, 1962, will have on its technical agenda rubber, plastics, and other petrochemicals. This exhibition, last held in 1959, typically attracts well over a thousand exhibitors. The 1959 Fair had 1300 exhibitors from 24 nations. More information about this exhibition can be obtained from Commissariat General du Salon, 28, rue Saint-Dominique, Paris 7.

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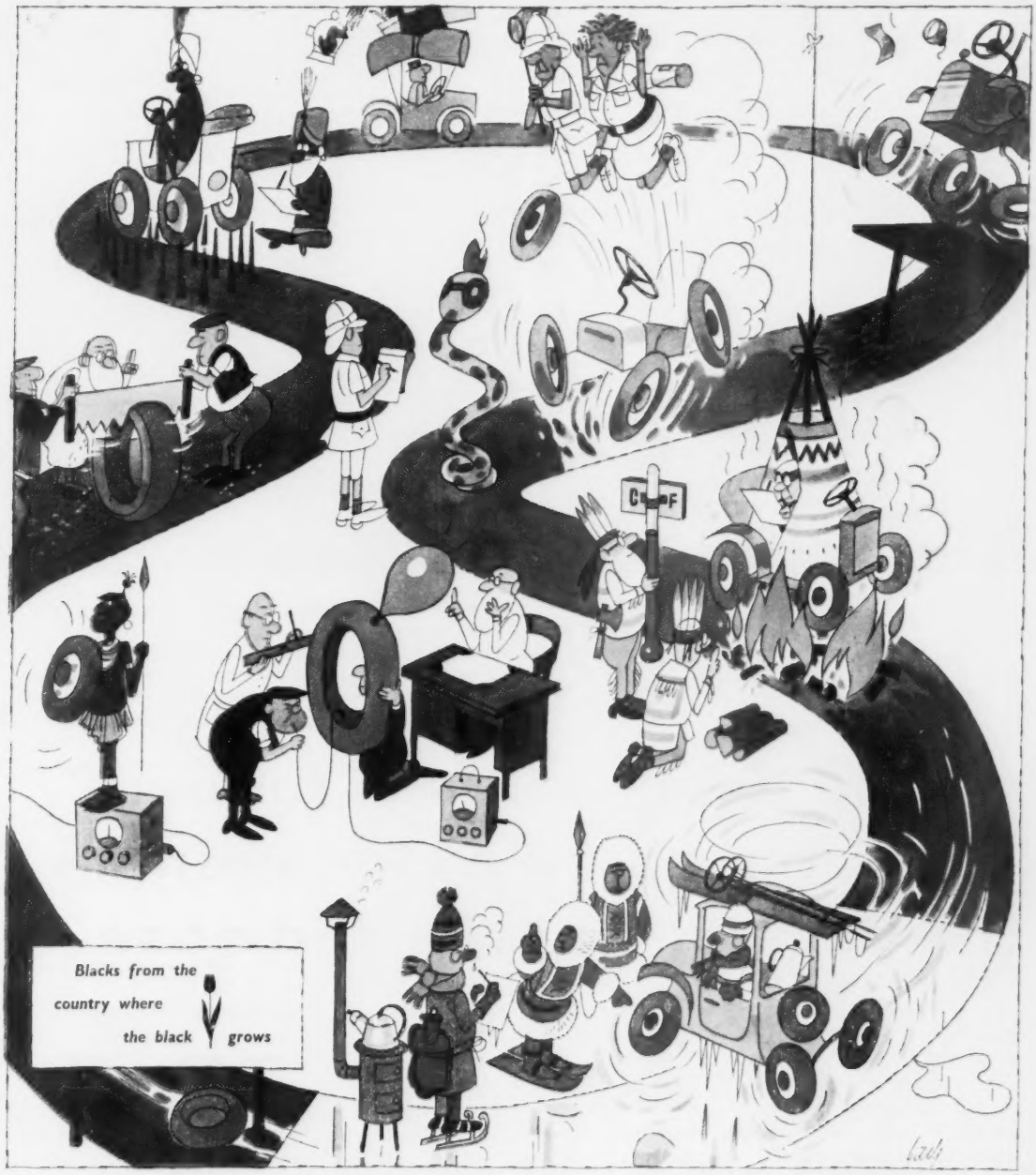

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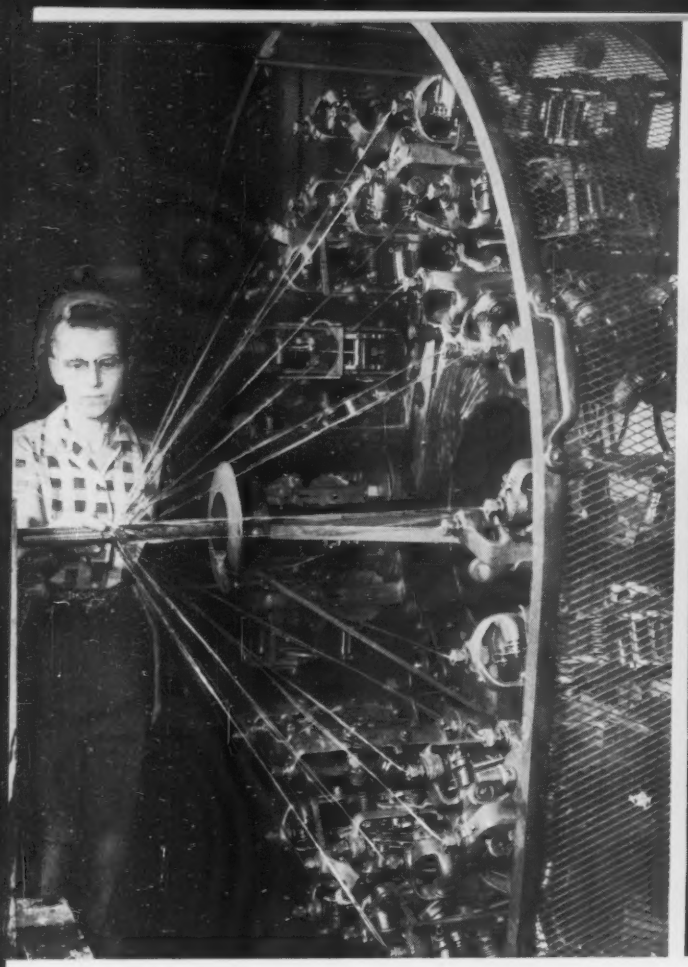


B. F. Goodrich Company braids multiple strands of steel wire into intricate sinews around rubber tube to help control and resist tremendous internal pressures required of flexible hydraulic hose. Wire such as supplied by Johnson has tensile strengths ranging from 240,000 to 400,000 psi.

Firestone Tire and Rubber Company uses only high tensile steel wire of exacting tolerances in building tire beads. Rapidly entering the bead machine in parallel —three to fifteen wires wide, depending on strength specified—the wires are coated with rubber. Clean bronze finish on Johnson wire assures proper rubber adhesion.

The best names in rubber use Johnson wire for strength and safety in tires and hose

The rubber industry has a sound reputation for producing quality products in advance of its needs by use of imaginative research—painstaking development of production methods—careful selection and testing of component materials.

Goodyear—Firestone—U.S. Rubber—B. F. Goodrich—Thermoid and others have established their names over the years by giving the general public and industry alike—strength, safety and durability in products such as long lasting pneumatic tires and tough pressure hose.

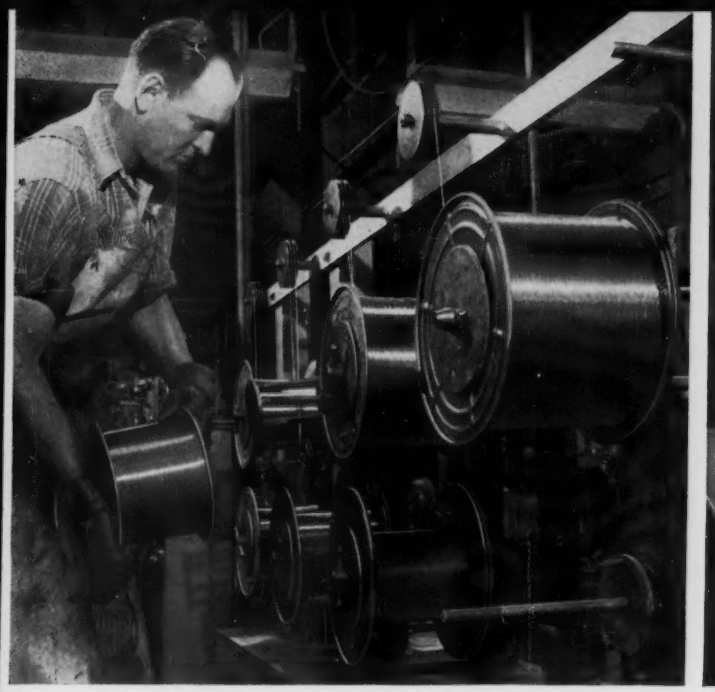
These two products owe their strength in part to the fine steel wires hidden inside them. For it is high-carbon steel bead wire which gives a pneumatic rubber tire—no matter what its size or job, the strength demanded by modern vehicles. Similar wire gives pressure hose its strong sinews which enable it to withstand working pressures as high as 10,000 psi—bursting strength may be three to four times as great.

Take the case of tire bead wire which Johnson supplies to every major tire manufacturer in the country. It is precision-drawn from special high-carbon rods to .037″ in diameter with a tolerance of only .002″—so fine that a 750-pound reel contains 39 miles of wire. Yet, a single strand exceeds 290 pounds of breaking strength equal to a tensile strength of 270,000 psi.

Also the wire must present a clean, unbroken surface and have a good and uniform bronze finish. This finish makes possible tight adhesion between the wire and the rubber surrounding it.

All these qualities contribute to the tire bead strength, help assure the safety of those who ride for work or pleasure on pneumatic tires.

Another special wire made by Johnson for the rubber industry helps rubber hose contain enormous pressures demanded by modern industrial applications. This reinforcing wire is drawn from selected high-



Thermoid Division, H. K. Porter Company, has cut wire rewind loss to ½ of 1% by use of Johnson Discard-a-Spool which eliminates overlaps and tangles, protects wire quality in shipment. The one-way disposable spool weighs only 28 ounces vs 200 ounces for standard spool—slashes tare weight 14 times.

United States Rubber Company wires tires for strength on this bead building machine. The strength comes from the steel wire bead in the edge of each tire. Johnson makes special high-carbon steel wire—.037″ in diameter with tolerance of only .002″ for U.S. and other major tire companies.

carbon steel in diameters ranging from .008″ to .020″ and has exceptional dimensional accuracy—tolerance is plus or minus .0005″.

Johnson hose reinforcement wire is supplied with a special liquor finish to provide maximum adhesion of steel to the rubber which fills the interstices between braids.

The wire is uniformly cast to make possible even spooling and has uniform tensile strength to prevent breaking under the working tension.

These excellent wire qualities, plus careful packaging and prompt delivery, have resulted in Johnson becoming a prime supplier to the rubber industry for hose reinforcement wire.

The outstanding performance of Johnson wire in the rubber industry is typical of the experience in other industries where Johnson supplies aircraft cord wire, armature binding wire, wire for brushes, metal stitching, preformed staple wire, bobby pin wire, rope wire, oil tempered and MB hard drawn spring wire, and music spring wire in a wide variety of sizes and finishes.

If you use specialty wires, call one of the offices listed to right and explore the advantages of Johnson quality which combines strength with economy.

The Goodyear Tire & Rubber Company finds that Johnson meets their exacting requirements for tire bead wire which has high tensile strength, twisting strength, elongation and special surface finish. Here parallel tire bead wires uncoil evenly into a bead building machine.

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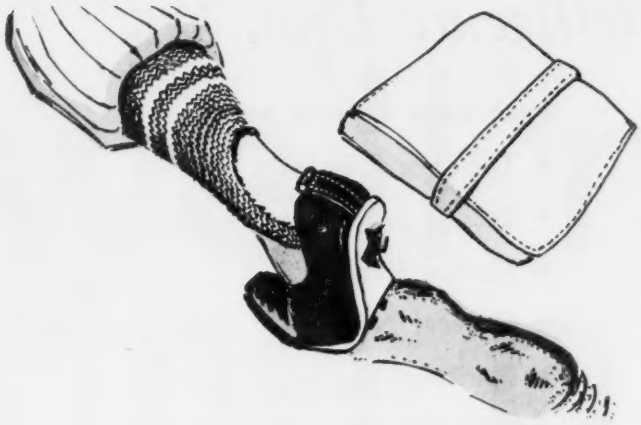

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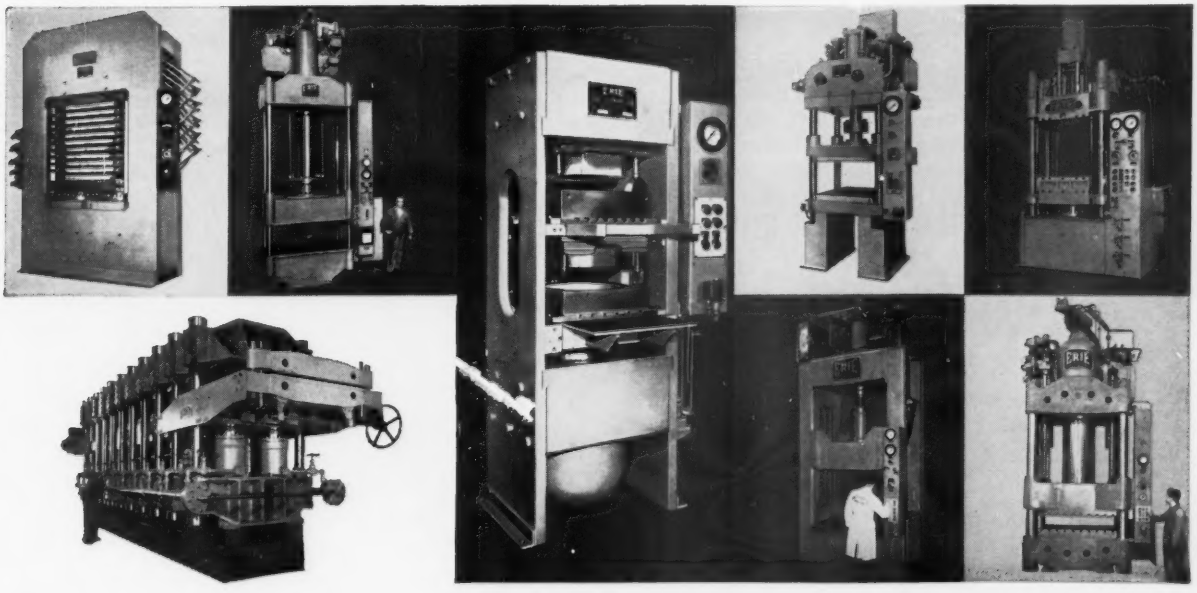

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The benefits of Butyl are now available in stable emulsion form!

New Butyl Latex roofs the heavens

Now you can get the outstanding properties of Butyl rubber in convenient latex form. New Enjay Butyl Latex is a chemically stable emulsion of 55% solids in water. Properly compounded, it combines the ozone resistance, low-temperature flexibility and low permeability of the base polymer with a high degree of chemical, mechanical and freeze-thaw stability.

Enjay Butyl Latex is odorless, safe and easy to handle; compatible with a wide range of resin and elastomeric emulsions. It can be easily compounded with pigments, fillers, thickeners and tackifiers. Pseudoplastic in nature, it exhibits remarkably low viscosity at high solids levels. Shipped in insulated 8,000- and 10,000-gal. tank cars and 55-gal. steel open-head drums.

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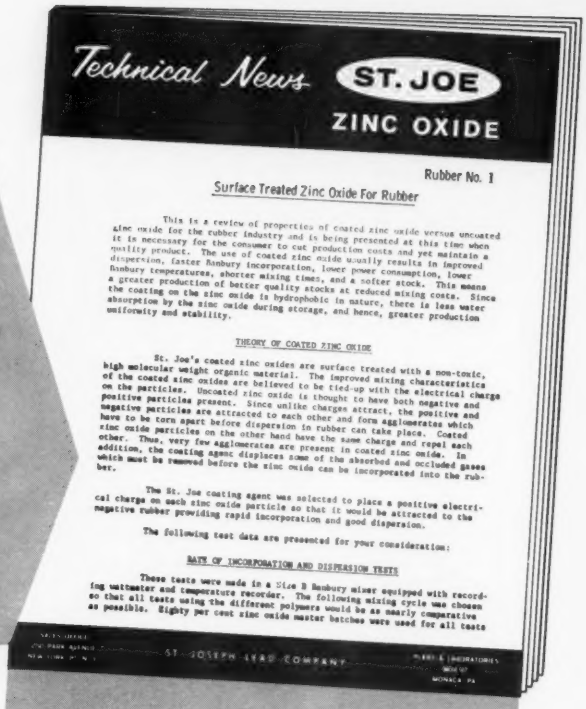

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Overseas

India—The Century Rayon Co. of Bombay will receive assistance from a West German, a Dutch, and a Swiss company in the construction and equipping of a factory to produce rayon cord for tires. The plant is to be built in Kalyan, near Bombay, and is scheduled to start production towards the end of next year. The three firms which will assist the Indian company are Vereinigte Glanzstoff-Fabriken AG of Germany, AKU of Arnhem, The Netherlands, and A. Manurer SA of Berne, Switzerland.

Ceylon—Ceylon and China have concluded talks held in Colombo for the renewal of the rubber-rice pact between the two countries. It is reported that China has agreed to pay 5c more than ruling Singapore prices for every pound of rubber bought from Ceylon. Last year, Ceylon bought 160,000 metric tons of rice in exchange for 17,000 metric tons of rubber.

Japan—Japanese Geon Co. is reported to be negotiating with B. F. Goodrich Co., Akron, Ohio, for techniques for the production of *cis*-polybutadiene. Three other Japanese firms, the Asahi Chemical Co., the Bridgestone Tire Co., and Ube Kosan Kaisha, are said to be planning production of stereo-specific rubber under technical tie-ups with foreign producers.

Mexico—Negromex S.A., a company formed recently by a group of Mexican businessmen, will build a $4,000,000 plant at Salamanca for the production of carbon black. The company will operate under a license granted by Phillips Chemical Co., Akron, Ohio. Due onstream within 12 to 14 months, the new unit will have an annual capacity of 33 million pounds.

Southern Rhodesia — Goodyear International Corp. has reached an agreement whereby Dunlop Rhodesia, Ltd., will manufacture a full range of Goodyear passenger and truck tires in Dunlop's factory in Bulawayo. The tires will be distributed by Goodyear throughout the Central African Federation, composed of Southern Rhodesia and Nyasaland.

Dominican Republic—The Secretary of Agriculture has announced that by 1964-1965, approximately 102,000 trees will be in production, and it is estimated that 1,020,000 pounds of rubber will be produced. Further plantings of 89,000 trees in the San Francisco de Macoris and Miches areas are proceeding.

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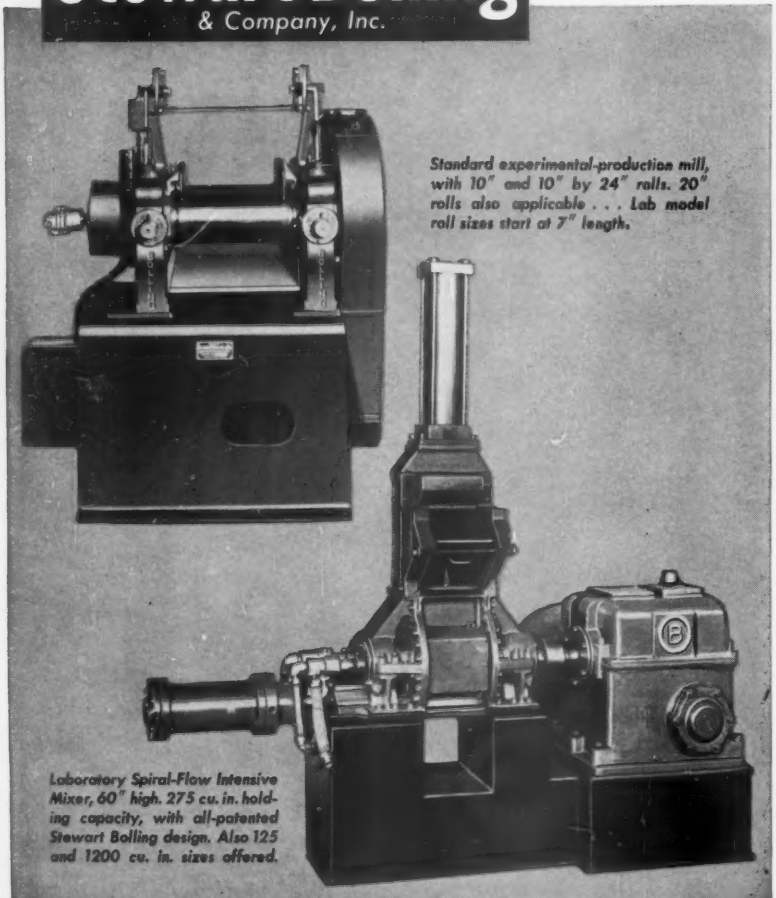

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News in Brief

► Disogrin Industries, Mt. Vernon, N. Y., has issued new specification and data sheets on two of its new lines of solid polyurethane hydraulic components. One covers its line of urethane rod wiper/scrapers and the other Disogrin's complete series of urethane O-rings.

► Officials of the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., have unveiled a Bronze Tablet in the Manhattan Hospital, dedicated to the memory of the late Miss Alma Beucker, supervisor of the hospital for Manhattan employees from 1917 until her retirement in 1948.

► Two envelope stuffer folders, entitled "Proper Care of Boat Trailer Tires Pays Off in Safety and Mileage", and "How to Get Better Service from Mobile Home Tires", have been published by the Rubber Manufacturers Association, Inc., New York, N. Y.

► American Standards Association, New York, N. Y., is offering a 64-page booklet, called "ISO Memento", which details the work of the International Organization for Standardization (ISO). Price is $4.80.

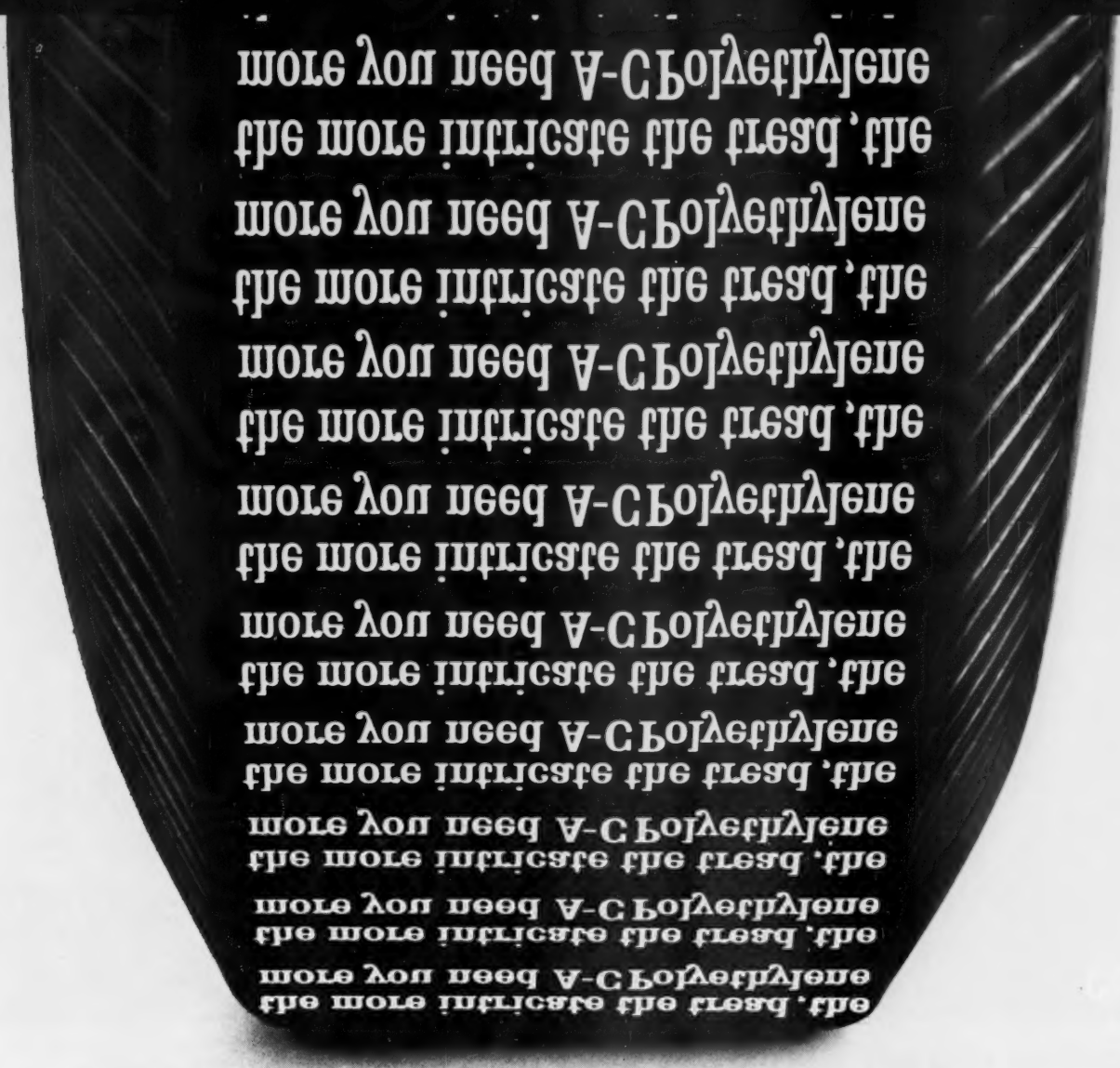
► The Synthetic Rubber Division of the Shell Chemical Co., Torrance, Calif., has issued technical bulletins on masterbatches S-1815, SP-102, S-1024 (a styrene-butadiene copolymer), S-7702, S-1608 and S-7757.

► United Carbon Co., Inc., New York, N. Y., has issued Techniques No. 6, on extending carbon black masterbatches for economical mechanical goods compounds.

► A polyester-type plasticizer, Eastman TXP-126, is described in a 6-page technical data sheet by Eastman Chemical Products, Inc., Kingsport, Tenn.

► The Cellulose Products Department of the Hercules Powder Co., Wilmington, Del., has changed its designation to the Polymers Department.

► R. D. Abbott Co. Inc. has changed its address to 5268 Alhambra Ave., Los Angeles 32, Calif. The new telephone number is CApital 3-1340.



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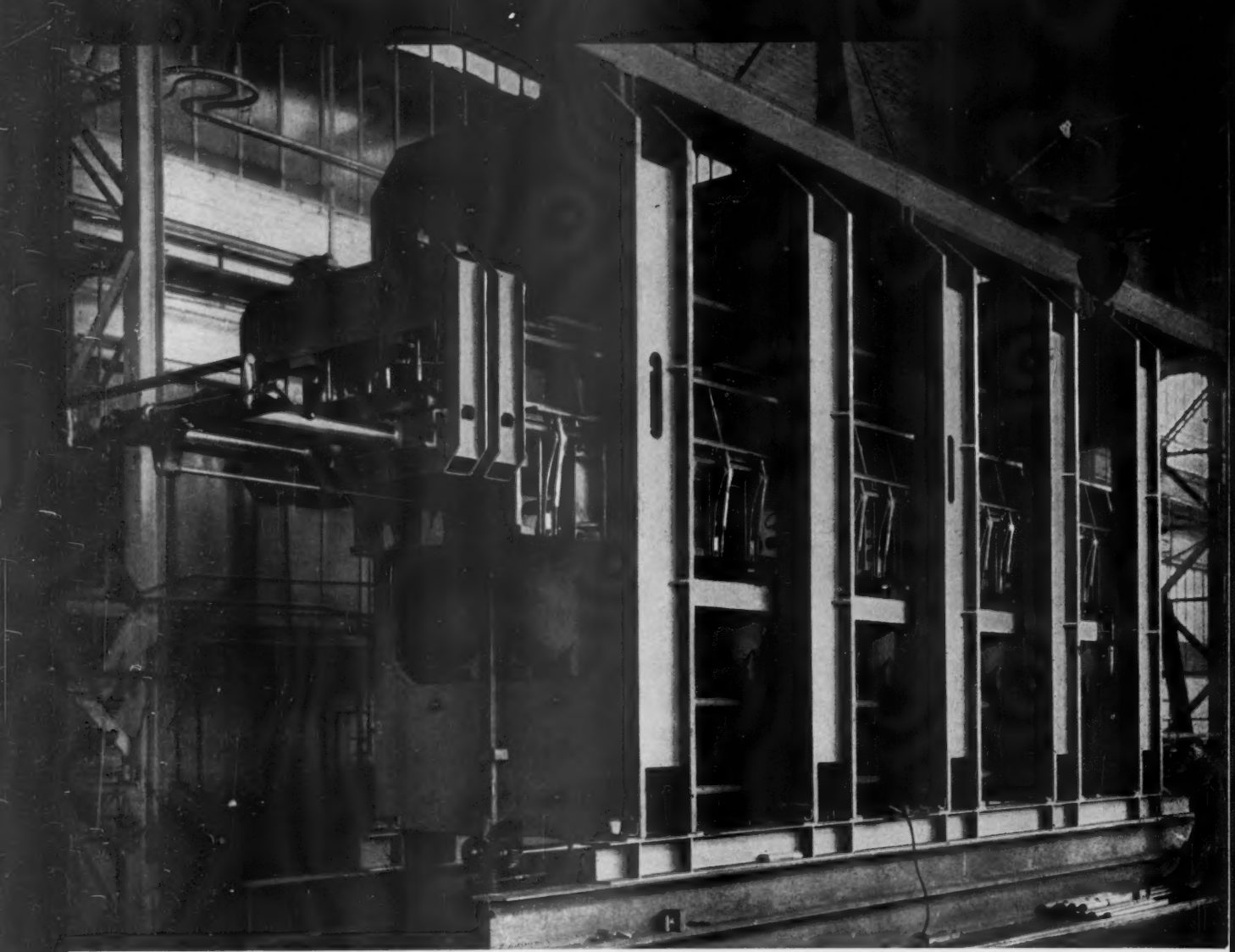

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259	"	for nitrile rubber, black
97	"	for nitrile rubber, nonblack
254	"	for neoprene, black
116	"	for neoprene, nonblack
101	"	for butyl, black
57	"	for butyl, nonblack
50	"	for polysulfide, black and nonblack
36	"	for reclaim (all black compounds)
45	"	for Hypalon, black and nonblack
86	"	for silicone rubber, black and nonblack
92	"	for vinyls (all nonblack compounds)
100	"	for miscellaneous other rubbers, black and nonblack
156	"	for blends of general purpose rubbers (natural, styrene, butyl, reclaim), black
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Synthetic Rubber Compounding
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Physical Examination of Brass Deposits
Chemical Examination of the Rubber-to-Brass Bond
Properties of the Rubber-to-Brass Bond
Bonding Agents, Thermoplastic
Bonding Agents, Halogenated Rubber Derivatives
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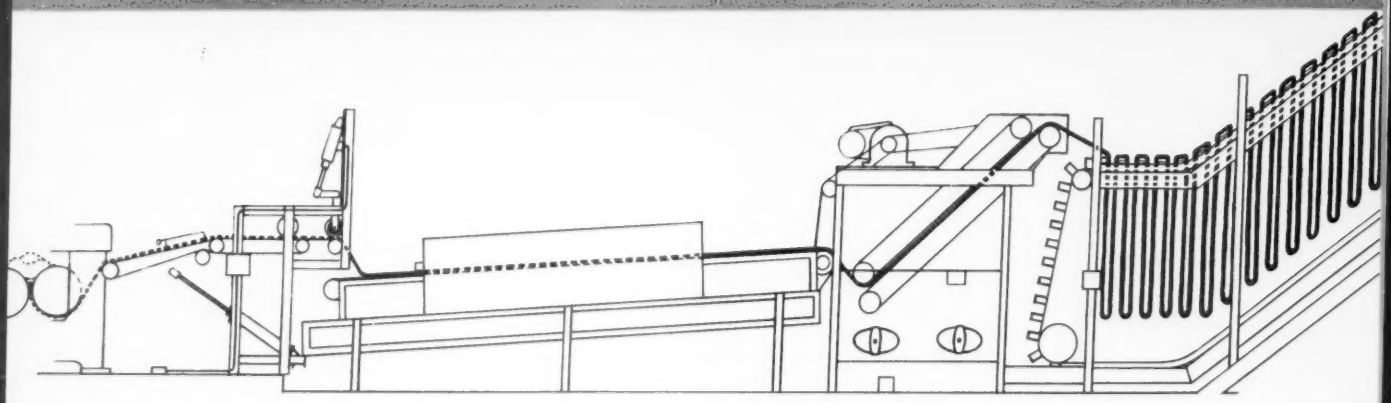
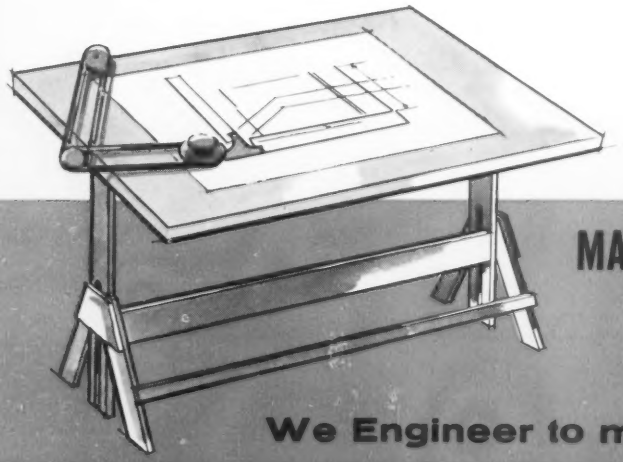
Plan on BATCH-OFF EQUIPMENT CUSTOM-BUILT By AKRON STANDARD



Layout shown above consists of: hinged air operated banbury dump mill take-off conveyor; stock marking unit; splicing unit connecting the individual batches into a continuous strip; mist precooling, lubrication; drying and cooling festoon rack; and rotary slab cutter. This is a special layout to take the stock from the first floor to the mezzanine or second floor, cooling and drying at the same time before reaching the cutter at the unloading end of the fixed bar festoon rack.



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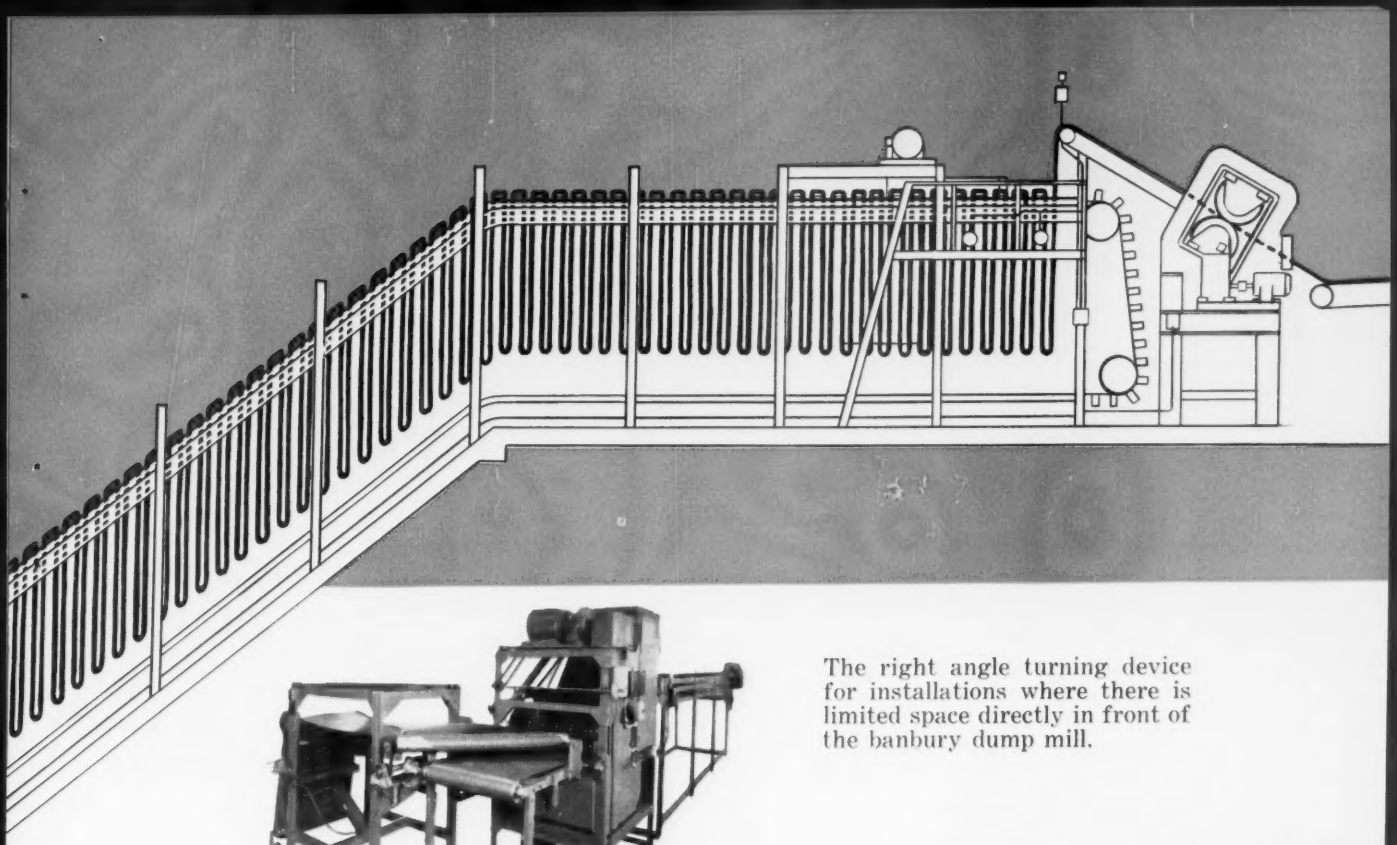
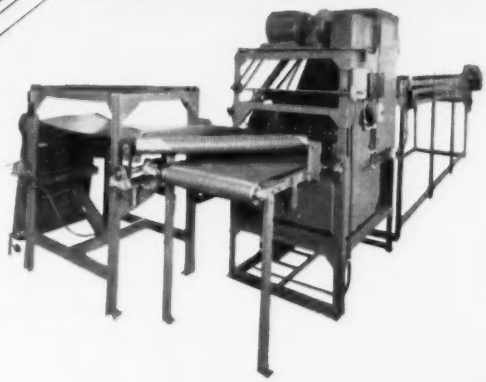
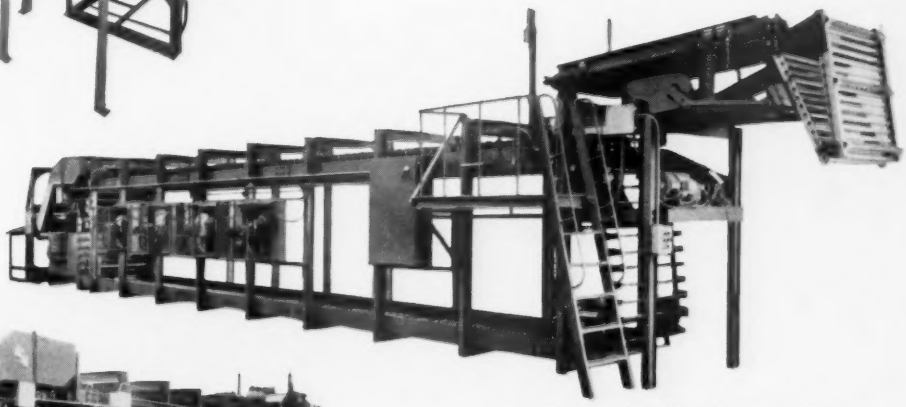
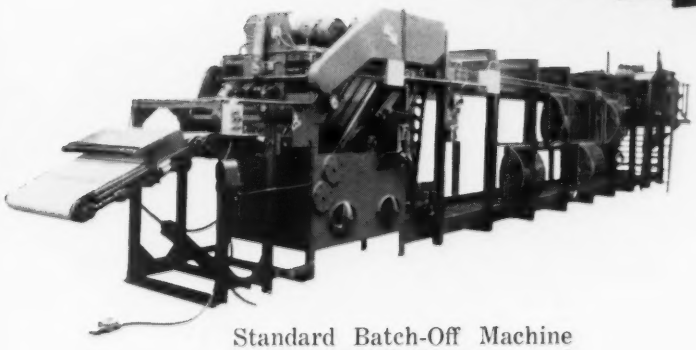




The right angle turning device for installations where there is limited space directly in front of the banbury dump mill.



Batch-Off Machine with Wig-wag Stacking Unit.



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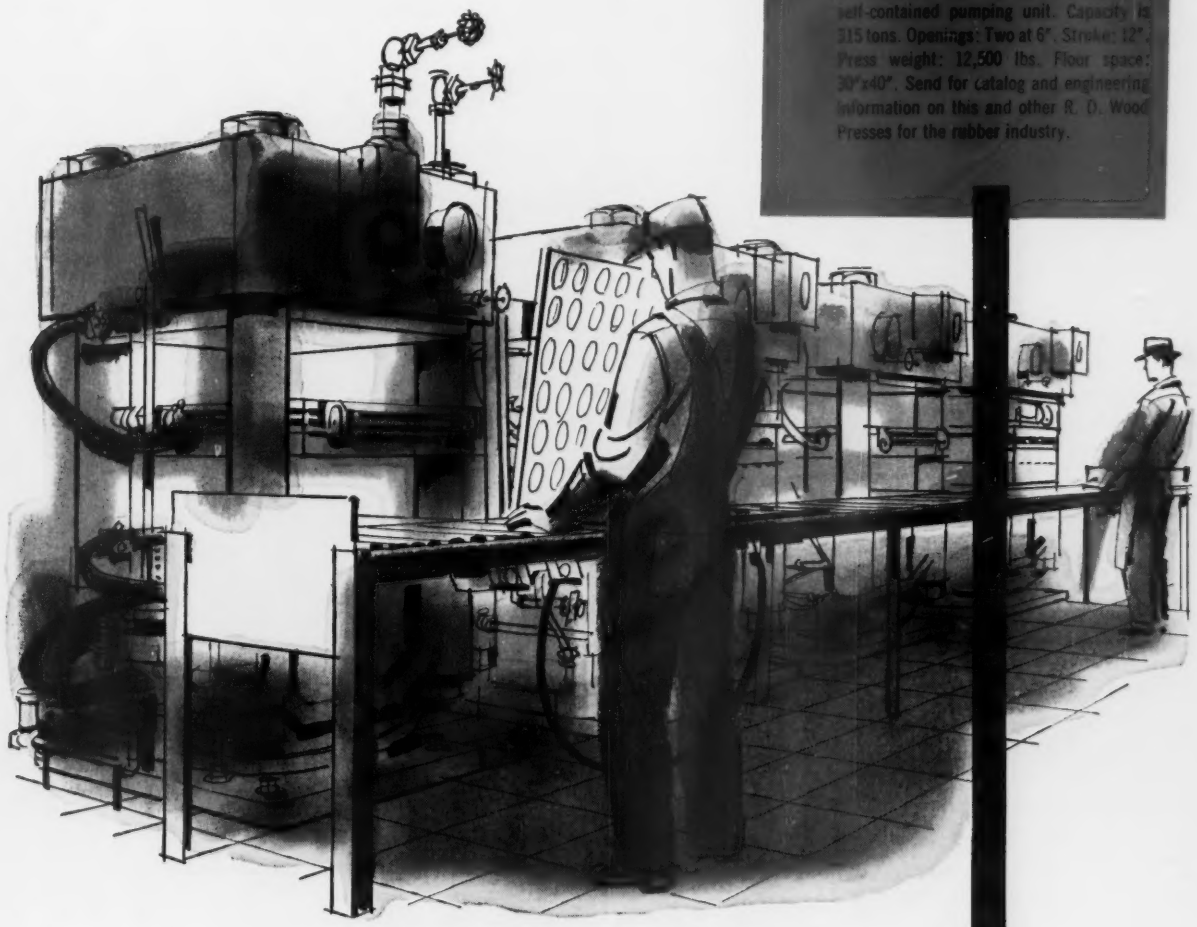

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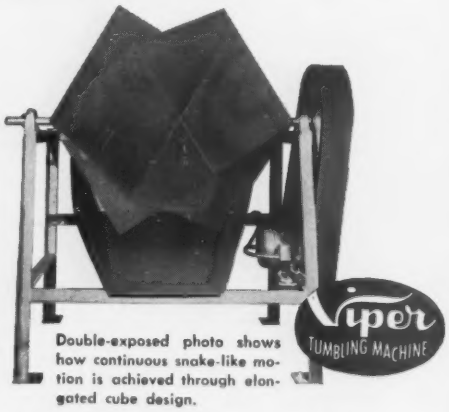

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PATENT REVIEW

by Melvin Nord

Production of Rubberlike Shaped Elements

U. S. Patent 2,961,290, issued November 22, 1960, to Gunter Kolb and assigned to Farbenfabriken Bayer A.G., discloses a process for the production of rubberlike shaped elements from rubbery polymers containing carboxyl groups. Emulsions are introduced into a precipitation bath containing polyfunctional compounds which are able to react with the carboxyl groups of the polymers, such as for example polyamines. The bath also advantageously contains electrolytes such as, for example, calcium chloride. The shaped elements obtained by this process have excellent technological properties, such as high tensile strength and high elongation.

Under the prior art, these elements had the disadvantage of experiencing cold flow under tension. It has now been found that this disadvantage can be obviated if synthetic elastomers containing acid groups are used in the form of their aqueous emulsions for the production of shaped elements, and if for coagulating the emulsions, polybasic organic acids are used as well as the polyfunctional organic compounds which are able to react with the acid groups of the synthetic elastomers.

As an example: 6600 parts of butadiene, 2600 parts of acrylonitrile and 800 parts of maleic acid monobutyl ester were emulsified in a solution of 250 parts of the sodium salt of a paraffin sulphonic acid with about 12 to 18 carbon atoms in 14,200 parts of water and 200 parts of N/1 sulphuric acid and polymerized while stirring at 15°C. after adding 40 parts of N-dodecyl mercaptan and 40 parts of the sodium salt of a paraffin sulphonic acid with about 12 to 18 carbon atoms. A yield of 80 per cent is obtained after 20 hours. The polymerization is stopped by adding 60 parts of sodium hydrosulphite, 2 per cent (based on the monomers) of the usual stabilizers, such as phenyl-β-naphthyl amine, are added and gas is removed from the preparation by steam distillation of the residual monomers.

Further suitable stabilizers are condensation products of cresols and camphene, 2, 6 ditertiary butyl-p-cresol, aralkylated products of diphenylamines, 2.2′-methylene-bis-(4-methyl-6-cyclohexylphenol). These compounds may be applied in quantities of 0.5 to 5 per cent as calculated on the weight of the polymers contained in the latices.

The emulsion thus obtained can be introduced at a constant hydrostatic pressure upwardly through a nozzle into coagulation baths. The coagulation filaments which are formed are with-

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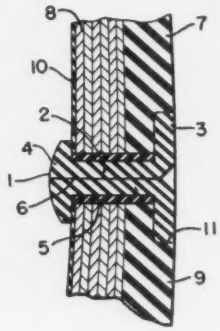
PATENT REVIEW

drawn over a synchronously running roller system, and then washed and dried. Filaments which can be used immediately are then obtained.

Rubber Valve

U. S. Patent 2,967,558, issued January 10, 1961, to John P. Urbon and assigned to the Goodyear Tire & Rubber Co., provides a rubber valve for tubeless tires. The figure shows a valve (1) having a shank (2) provided with an enlarged head (3) and an inner enlarged end (4), the shank being provided with a sheath (5) to protect



the shank from the cutting and abrasive action of the wall of the opening in which the valve is mounted. The valve has a pre-formed air passage (6) for the reception of an inflation needle. The sheath (5) is made of a rubber that is compounded to offer very high resistance to abrasion and cutting but is still pliable enough to permit radial compression and elongation thereof. The valve, except for the sheath, is compounded so that it will be more pliable and resilient than the sheath so that when compressed it will close the valve passage and yield readily to the passage of an inflation tube therethrough. It must also be of rubber which will operate at very low temperatures as well as at normal or high temperatures.

Reclaiming Scrap Vulcanized Rubber

U. S. Patent 2,966,468, issued December 27, 1960, to Paul J. Dasher and assigned to Dasher Rubber & Chemical Co., describes a process for reclaiming defibred whole tire scrap vulcanized rubber to obtain a reclaim product requiring no refining. The process consists of the following steps:

(1) Subjecting a mass of the scrap to intense shearing action in a confined working space while

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A product of United States Rubber Company, this raft is made of nylon fabric from Wellington Sears. Coated with neoprene and vulcanized, the strong, light fabric assures long life in both extended storage and service.

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exerting mechanical pressure on the mass to compact and densify it for 1 to 4 minutes at 150° to 250°F., thereby converting the mass into finely divided powder without devulcanization of the rubber—at least 80 per cent of the powdered rubber being fine enough to pass a 40 mesh screen; (2) Separating from the powder the portion which passes a 20 mesh screen; (3) Subjecting this portion of the powder to additional shearing action for 5 to 8 minutes at 300° to 400°F., thereby devulcanizing the rubber; and (4) Sheeting the resultant mass.

Vulcanization of Natural and Synthetic Rubbers

U. S. Patent 2,962,481, issued November 29, 1960, to Vincent Kerrigan and Walter R. Pryer, assigned to Imperial Chemical Industries, Ltd., discloses a process for the vulcanization of natural and synthetic rubbers. Before vulcanization, there is incorporated in the rubber an N-tertiary-octyl-bis-(benzthiazyl-2-sulphen) imide.

Other Patents of Interest

Subject	Inventor or Assignee	Patent No.	Date
Tire buffing machine	Paul E. Hawkinson Co.	2,965,162	12/20/60
Latex paint	Devoe & Raynolds Co., Inc.	2,965,590	12/20/60
Vulcanizable composition consisting of halogenated butyl rubber and stannous chloride	Esso Research & Engineering Co.	2,965,600	12/20/60
Polymerization of chloroprene	Farbenfabricken Bayer A.G.	2,965,604	12/20/60
Plug-type repair for tires	Technical Rubber Co., Inc.	2,966,189	12/27/60
Cartridge plug tire patching apparatus	Central California Engineering Corp.	2,966,190	12/27/60
Tire beads	Compagnie Generale des Etablissements Michelin	2,966,933	1/ 3/61
Recapping and repairing tires	Wilhelm Schelkmann	2,966,936	1/ 3/61
Apparatus for making a tire carcass	Continental Gummi-Werke A.G.	2,967,564	1/10/61

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington, D. C., for 25 cents each. Do not send stamps.

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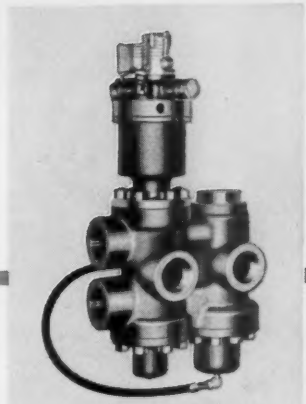
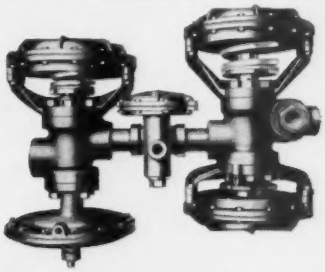
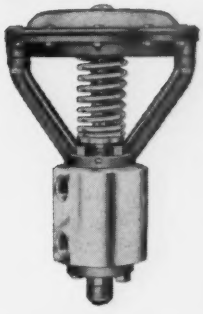


3,000 PSI, 4-WAY SEMI-AUTOMATIC air operated, handles oil, water, glycol-base fluids, 1 - 2 in. NPT.

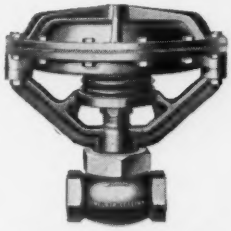
300 PSI, 3-WAY OR REVERSE ACTING bridge yoke, triple-guided stem, ¼ - 3 in. NPT.



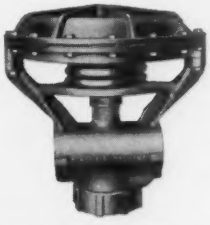
4,000 PSI, 3-WAY AUTOMATIC 2-pressure, auto-neutral, throttling, ½ - 3 in. NPT.



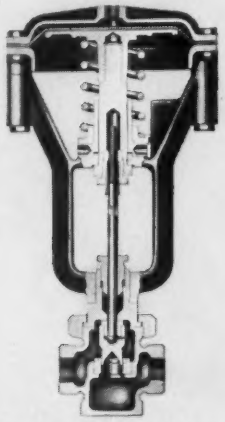
4,000 AND 6,000 PSI, 2 AND 3-WAY BALANCED NC or NO, pressure above or below seats, ½ - 2 in. NPT.



150 AND 300 PSI, DIRECT ACTING globe body, top-guided stem, ¼ - 3 in. NPT.



150 PSI, 3-WAY OR REVERSE ACTING, ¼ - 3 in. NPT VACUUM, 2-WAY, 1 - 3 in. NPT compact design, positive sealing, bridge yoke.



250 PSI, 2-WAY V-PORT MODULATING controls temperature, pressure or flow, direct or reverse acting, ½ - 2 in. NPT.

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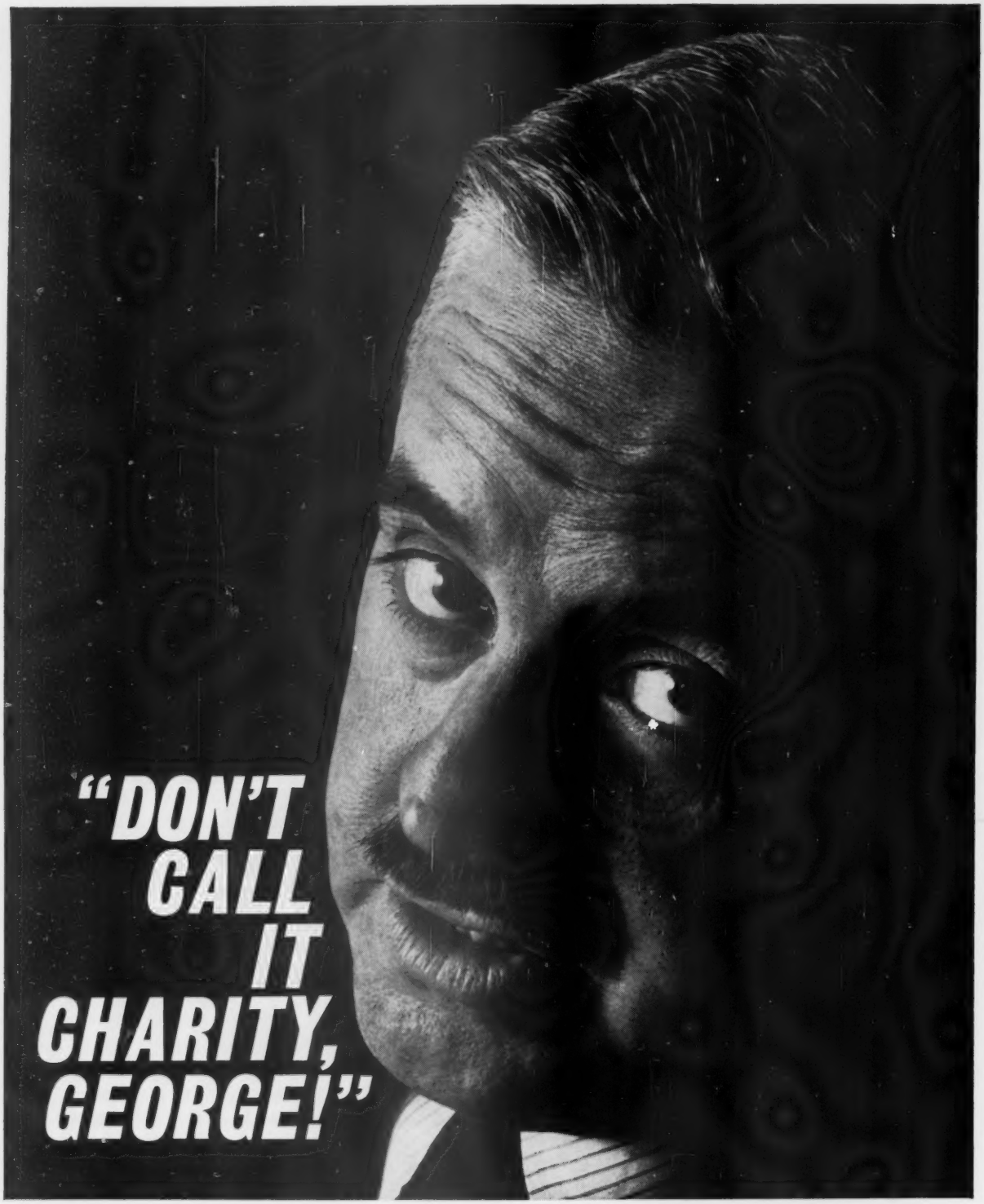

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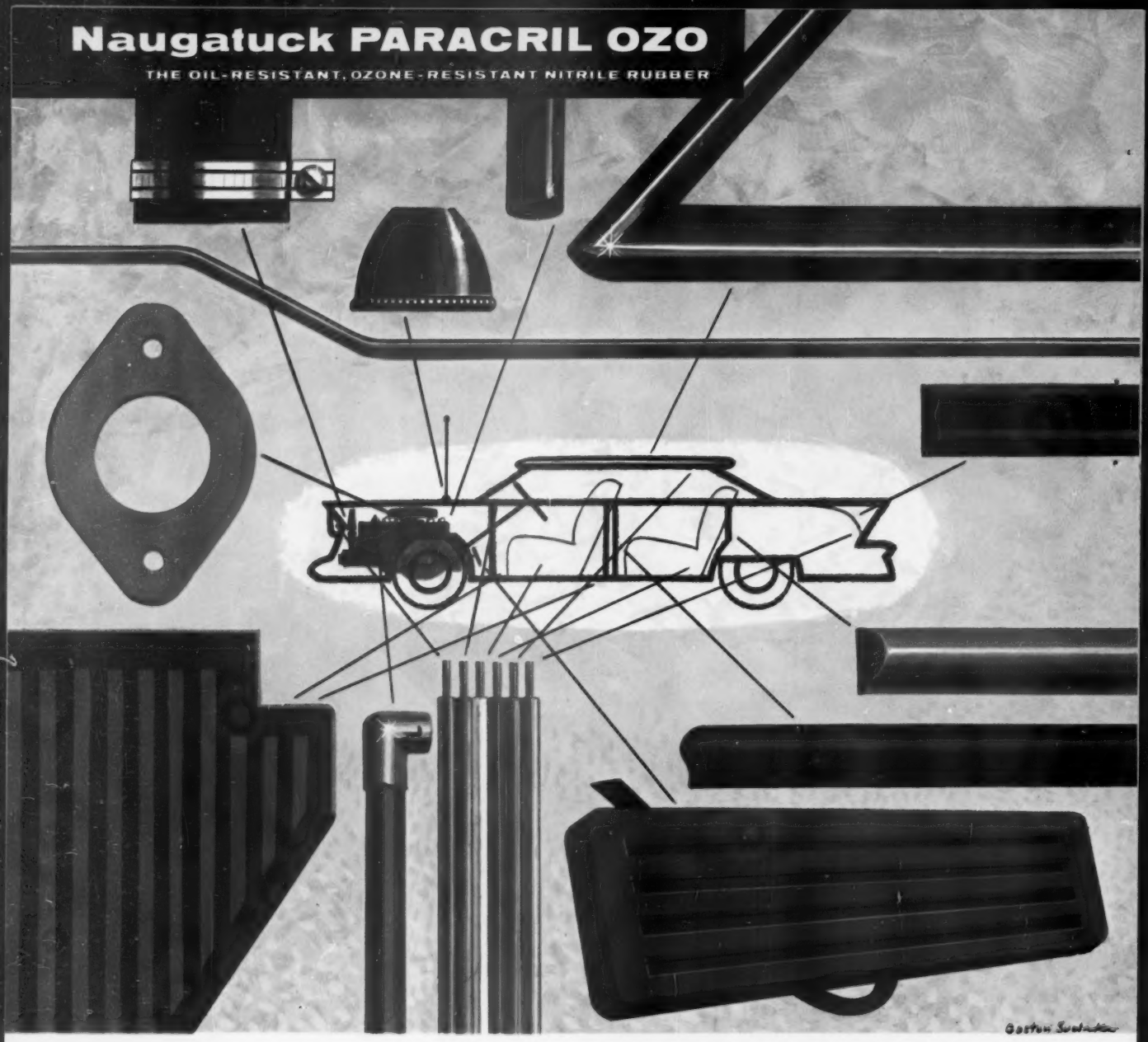

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Ozone Resistant NBR/PVC Vulcanizates

Prefluxing selected ratios of NBR and PVC resin produces compounds suitable for applications where both oil and ozone resistant properties are necessary

By W. A. WILSON

Goodyear Tire & Rubber Co., Akron, Ohio

Summary

► By proper choice of acrylonitrile-butadiene (NBR) polymers, polyvinyl chloride (PVC) resins and processing conditions, NBR/PVC vulcanizates were produced with excellent resistance to ozone attack and weathering. The excellent oil and fuel resistance normally associated with NBR compounds was maintained or improved. To develop optimum physical properties and ozone resistance, it was essential to adequately flux the NBR and PVC resin together at a temperature above the fluxing temperature of the PVC resin. When PVC resins of increased molecular weights were used, the fluxing temperature of the NBR/PVC blend had to be increased proportionally to obtain optimum physical properties and ozone resistance. Higher levels of low molecular weight PVC resins were required to develop good ozone resistance.

Of the various PVC resins and NBR polymers investigated, the blends containing either a low molecular weight PVC resin or a low acrylonitrile content NBR polymer had relatively poor ozone resistance. Conventional carbon blacks, light colored pigments and plasticizers were used with no deleterious effect on the ozone resistance properties of the NBR/PVC blends. If they meet the specific requirements desired, commercial prefluxed elastomer blends of NBR and PVC are available and more convenient to use. Because of the excellent ozone and weathering resistance obtained, modification of NBR vulcanizates with PVC resin increases the range of useful applications of NBR polymers in areas of competition with the more inherently ozone-resistant polychloroprenes.

POOR ozone and weathering resistance of acrylonitrile-butadiene (NBR) vulcanizates have been limiting factors in extending the useful range of applications of these materials. Conventional antiozonant chemicals and methods of protection are not as effective with the NBR polymers as they are with natural rubber (NR), butadiene-styrene (SBR) polymers and polychloroprene *(1)*. The modification of NBR polymers with polyvinylchloride (PVC) resins to produce vulcanizates with improved ozone resistance has been previously reported *(2, 3, 4, 5)*. Blends containing 20 to 40 per cent of PVC resin were cited as having a favorable balance of properties *(4)*. Because of an increasing interest and need for protection of NBR polymers against ozone attack *(6)*, a further study was made of possible factors influencing properties obtained by modifying NBR polymers with PVC resins. Specific attention was given to mixing techniques and compounding variables which might influence ozone and weathering resistance of the NBR/PVC blends.

Prefluxed elastomer blends of NBR and PVC have been introduced commercially at a premium price over the separate components. Such materials have had the essential fluxing operation incorporated into their

Note: This paper was presented before the 77th Meeting of the Division of Rubber Chemistry, American Chemical Society, Buffalo, N. Y., May 4 to 6, 1960.

TABLE I—EFFECT ON GUM STOCK PROPERTIES OF FLUXING 67/33 NBR/PVC BLENDS AT INCREASING TEMPERATURES

Chemigum N600[1]	100.00	Prefluxed at the indicated temperatures
Pliovic S-70[1]	50.00	
Mark XI[2]	1.00	
Mark XX[2]	.50	
Zinc Oxide	3.00	
Stearic Acid	.50	
Amax[3]	1.50	
Unads[3]	.40	
Sulfur	1.50	
	158.40	

Test Specimens Cured 15 Min. at 310° F.

	Mill Fluxing, Roll Temperature, °F, 5 Minutes				
	260	280	300	320	340
Tensile, psi	1240	1650	2400	2675	2925
NBS Abrasion Index	80	173	208	207	197
ASTM D-746, °C.	—42	—69	—69	—72	—72

	00 Banbury Fluxing, 50 RPM, 250° F. Jacket and Rotors						
Dump Temp, °F.	252	262	280	300	320	341	360
Tensile, 15′/310°F.	825	825	975	1450	1625	2725	2900
Tensile, 15′/350°F.	975	1000	1140	1375	1450	2475	2925
NBS Abrasion Index	40	49	56	116	182	223	288
ASTM D-746, °C.	—26	—26	—35	—68	—70	—70	—70
Orec Ozone Box Aging, 50 pphm ozone, 100°F, 10% strain, 144 hours, cracking							
Static	Severe	Severe	Severe	None	None	None	None
Dynamic (30 Flexes/min)	Fine	Fine	Fine	None	None	None	None

(1) Goodyear Chemical Division
(2) Argus Chemical
(3) R. T. Vanderbilt

manufacture. Prefluxed elastomer blends are confined to a particular combination of NBR and PVC and therefore restricted in oil resistance and other related properties to the specific NBR and PVC used. However, they are suitable for a number of applications. The following prefluxed elastomer blends were recently introduced by the Chemical Division of The Goodyear Tire & Rubber Company: Chemivic 400, General Purpose; and Chemivic 800, Special Processing for Calendering and Extrusion. Thus a choice may be made either to blend specific NBR polymers and PVC resins for desired properties or to use the more convenient commercial NBR/PVC elastomer blends when the required properties may be met.

While this paper is confined mainly to the subject of a variety of NBR/PVC blends and to factors which might affect their properties, the merits of Chemivic 400 are also briefly discussed.

Laboratory and Experimental Procedures

Previous work indicated adequate fluxing of the NBR/PVC blend was necessary for the development of optimum physical properties and ozone resistance. For this reason the NBR polymer, PVC resin and PVC stabilizers were prefluxed together either in a laboratory size 00 Banbury or on a 16 inch even-speed mill. Resultant blends were sheeted off and allowed to cool. Additional compounding materials were added to the prefluxed NBR/PVC blends in the laboratory Banbury and curative chemicals added on the laboratory 16 inch mill.

Test strips for ozone and weathering tests were cut from .075 inch sheets. Static and dynamic ozone tests were run on 6 by .5 inch strips. Excellent static ozone resistance exhibited by the NBR/PVC vulcanizates necessitated a more severe test. Improvised severely strained test specimens were therefore employed in some evaluations. A 4 by 6 by .075 inch cured sheet was folded in half upon itself and clamped in place by 3 paper clips inserted along the folded edge approximately 1.25 inches apart. This subjected a severely strained folded edge of the test specimen to ozone exposure. Figure 6A contains an end view of some exposed samples. Samples were exposed in either a Mast Model 700-1 *(7)* or OREC Model 0300 *(8)* ozone chamber. Evaluation of results was of a performance-observation nature. Observations were made for any indication of ozone cracking at a selected exposure time.

Weathering tests were conducted on wedge shaped

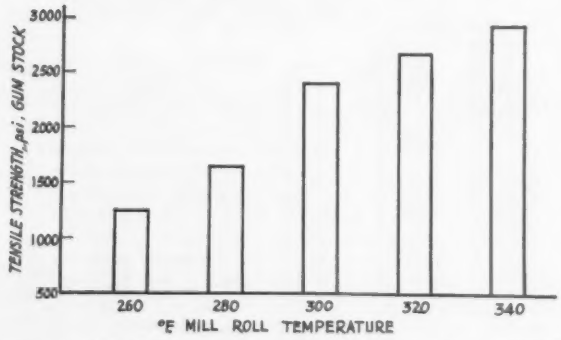

FIG. 1—Mill fluxing temperature of 67/33 Chemigum N600/ Pliovic S-70 blend.

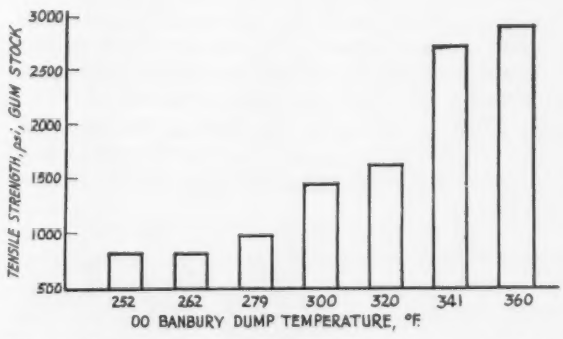

FIG. 2—Fluxing temperature effect on tensile strength: 67/33 Chemigum/Pliovic S-70 blend.

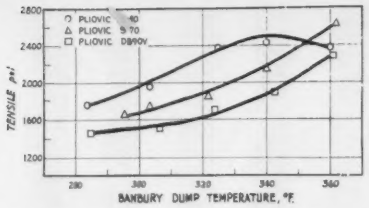

FIG. 3—Effect of mixing temperature on tensile: Chemigum N6B/Pliovic resins, 67/33.

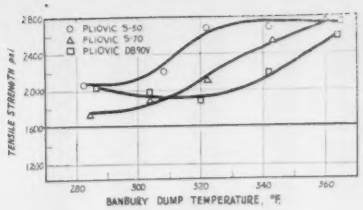

FIG. 4—Effect of mixing temperature on tensile: Chemigum N600/Pliovic resins, 67/33.

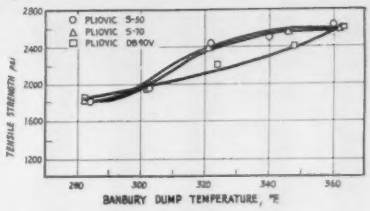

FIG. 5—Effect of mixing temperature on tensile strength: Chemigum N8/Pliovic resins, 67/33.

strips at an average of 15 per cent elongation *(9)*. Samples were exposed at Akron, Ohio. Evaluation of cracking was based on a two-number rating system as described by Ambelang and Habeck *(10)*. The first number indicates the number of cracks as applied to the area of the test specimen. Ratings of 0 to 4 are possible with a 4 rating indicating more than ¾ of the surface attacked. The second number indicates the severity of the cracks and the rating range is from 0 to 10. A 1 rating is .01 to .02 inch long cracks and a 10 rating is .25 inch or over.

Because of the thermoplastic nature of PVC resins, low temperature properties were also investigated. ASTM D-746, impact brittleness temperature, and ASTM D-1053, torsional stiffness temperatures, were employed as test methods.

Conventional rubber compounding techniques and materials were employed in the evaluation formulas. Vinyl stabilizers were restricted to the barium-cadmium laurate type in conjunction with a chelating agent. These gave adequate stabilization and were versatile in usage with either black or light colored compounds. Except where noted, the percentages of PVC resin were restricted to a 30 or 33 per cent level which afforded a favorable balance of properties and limited the thermoplastic effect of the PVC.

Effect of Fluxing Temperature

Adequate fluxing of the NBR/PVC blends was essential to develop maximum physical properties and ozone resistance. Undispersed PVC resin particles may serve as points of undue strain to initiate ozone cracking.

Blends of 50 parts of Pliovic S-70, a medium-inherent-viscosity PVC resin, and 100 parts of Chemigum N600, a medium-acrylonitrile-content NBR, were fluxed at intervals of increasing temperatures on a mill or in the laboratory size 00 Banbury. Mill fluxing consisted of banding the NBR on a 16 inch even-speed laboratory mill which was set at a specified roll temperature. PVC and vinyl stabilizers were added and the blend fluxed for 5 minutes before sheeting off and cooling. Laboratory Banbury fluxing consisted of mixing the NBR, PVC and stabilizers to specified dump temperatures at intervals from 250 to 360°F. These blends were evaluated in a gum-type formulation shown in Table I.

Figure 1 indicates the direct dependency of tensile strength upon mill fluxing temperatures. Figure 2 indicates similar results as Banbury dump temperatures were increased. Mill fluxing for a time at a given temperature was slightly more effective than mixing to a similar Banbury dump temperature. The blends showed marked improvements in abrasion resistance, low temperature properties and ozone resistance as the fluxing temperature was increased. The tensile strength of the adequately fluxed blends showed excellent reinforcement by the PVC resin. Tensile strength was not increased by raising the curing temperature to 350°F. The objective of obtaining an intimate homogeneous blend of the NBR and PVC could not

TABLE II—BASIC FORMULATION FOR EVALUATING EFFECT OF FLUXING TEMPERATURES OF 67/33 NBR/PVC BLENDS ON TENSILE STRENGTH AND OZONE RESISTANCE

NBR	100.00	Prefluxed to Indicated Temperature
PVC Resin	50.00	
Mark XI[1]	1.00	
Mark XX[1]	.50	
Zinc Oxide	3.00	
Stearic Acid	1.00	
SRF Black	50.00	
Plasticizer SC[2]	12.50	
Plasticizer KP140[2]	12.50	
Altax[4]	1.50	
Unads[4]	.25	
Sulfur	1.50	
	233.75	

Test Specimens Cured 20 minutes at 310° F.

PVC Resins Used

	Average Inherent Viscosity	Mill Fluxing Range
Pliovic[5] S-50	.68	250-300° F.
Pliovic S-70	.86	300-320° F.
Pliovic DB90V	1.10	330-350° F.

Medium Acrylonitrile NBC Polymers Used

Chemigum[5] N6B	General Purpose, Non-staining
Chemigum N600	General Purpose, Low Temperature polymerized
Chemigum N8	Special Processing

(1) Argus Chemical
(2) Harwick Standard Chemical
(3) Ohio Apex
(4) R. T. Vanderbilt
(5) Goodyear Chemical Division

FIG. 6A—Samples of Pliovic S-50 after test in Mast Ozone Box, 100°F., 96 hours, 50 pphm ozone.

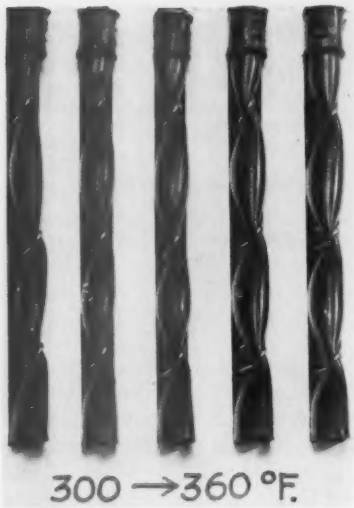

FIG. 6B—Samples of Pliovic S-70 after test in Mast Ozone Box, 100°F., 96 hours, 50 pphm ozone.

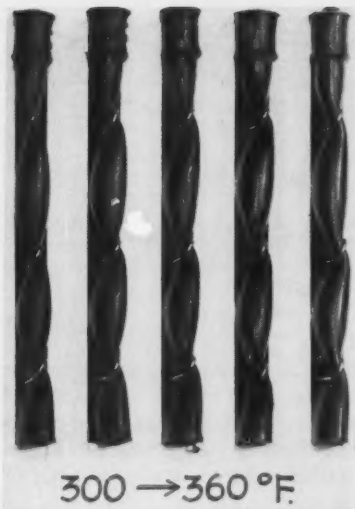

FIG. 6C—Samples of Pliovic DB90V after test in Mast Ozone Box, 100°F., 96 hours, 50 pphm ozone.

be obtained by high temperature alone, but fluxing together was necessary.

Further Investigation

Further investigation of the effect of fluxing temperatures was made by evaluating Banbury prefluxed NBR/PVC blends in an SRF compounded stock. Three PVC resins which varied in inherent viscosities and fluxing temperatures were evaluated. Three NBR polymers of medium acrylonitrile content were used. The basic formulation, PVC resins and NBR polymers are listed in Table II. Blends of each of the NBR polymers and PVC resins in a 67/33 ratio were prefluxed in the laboratory Banbury. Blends were dropped at approximately 20°F. temperature intervals between 280 and 360°F. The resultant series of blends were evaluated in the SRF formulation.

Dependence of tensile strength on fluxing temperature for each of the three NBR polymers and PVC resins is indicated in Figures 3, 4 and 5. Tensile values for Pliovic S-50, the lower molecular weight resin, started to level off at approximately a 320°F. blend dump temperature. Higher viscosity resins, S-70 and DB90V, had a more linear relationship with tensile strength increasing with dump temperatures.

Effect of fluxing temperatures on ozone resistance is summarized in Table III. Blends fluxed at the higher

TABLE III—EFFECT OF NBR/PVC FLUXING TEMPERATURE ON OZONE RESISTANCE CRACKING MAST OZONE BOX, 100°F., 10% STRAIN, 50 PPHM OZONE

	NBR Used								
	Chemigum N6B			Chemigum N600			Chemigum N8		
Approximate Banbury Dump Temperatures, °F.									
	Static, 144 hrs								
PVC Resin	S-50	S-70	DB90V	S-50	S-70	DB90V	S-50	S-70	DB90V
320	None	Cracks	Cracks	None	Cracks	Cracks	None	None	Cracks
340	None	None	Cracks	None	None	None	None	None	None
360	None	None	None	None	None	None	None	None	None
	Dynamic, 144 hrs, 60 Flexes/min								
320	Cracks	Cracks	Cracks	Cracks	Cracks	Cracks	Cracks	Cracks	Cracks
340	Cracks	None	Cracks	Cracks	Cracks	Cracks	Cracks	Cracks	Cracks
360	Cracks	None	None	Cracks	None	None	Cracks	Cracks	None
	Paper Clip, 96 hrs								
320	None	Cracks	Cracks	Cracks	Cracks	Cracks	None	Cracks	Cracks
340	None	None	Cracks	None	Cracks	Cracks	None	Cracks	None
360	None	None	None	None	None	None	None	Cracks	None

TABLE IV—FORMULATIONS FOR EVALUATING 70/30 BLENDS OF VARIOUS NBR POLYMERS AND PVC RESINS

	NBR/PVC A	No PVC B	
NBR (As Indicated)	100.00	100.00	
PVC (As Indicated)	43.00	——	Prefluxed 360° F.
Mark XI[1]	.87	——	Prefluxed 360° F.
Mark XX[1]	.43	——	Prefluxed 360° F.
Zinc Oxide	5.00	5.00	
Stearic Acid	1.00	1.00	
SRF Black	50.00	50.00	
Plasticizer SC[2]	12.50	2.50	
KP-140[3]	12.50	2.50	
Amax[4]	1.50	1.50	
Unads[4]	.25	.25	
Sulfur	1.50	1.50	
	228.55	164.25	

Test Specimens Cured 20 Minutes at 310° F.

NBR Polymers Used

Chemigum[5]	Acrylonitrile Content	Polymerization Temp.	Description	Mooney Range ML4-212° F.
Not Available Commr.	Low	Hot	General Purpose	——
N6B	Medium	Hot	General Purpose	40-65
N7	Medium	Hot	High Mooney	77-102
N600	Medium	Low	General Purpose	40-65
N8	Medium	Hot	Special Processing	75-102
N3	High	Hot	General Purpose	87-112

PVC Resins Used

Pliovic[5]	Average Inherent Viscosity	Processing Range, °F.	Description
S-50	.68	250-300	Low Molecular Wt.
S-70	.86	300-320	Medium Molecular Wt.
DB80V	.98	320-340	Dry Blend
DB90V	1.10	330-350	Dry Blend
W	1.10	——	Flooring Grade

(1) Argus Chemical
(2) Harwick Standard Chemical
(3) Ohio-Apex
(4) R. T. Vanderbilt
(5) Goodyear Chemical

temperatures may also be used to compare the inherent ozone resistance of the blends. While Pliovic S-50 fluxed at a lower temperature and imparted good static ozone resistance, the dynamic ozone resistances of the S-50/NBR blends were relatively poor. Both Pliovic S-70 and DB90V imparted good ozone resistance to Chemigum N6B and N600 when fluxed to 360°F. Chemigum N8, a special processing NBR with high moduli vulcanizates, required the high molecular weight Pliovic DB90V for good ozone protection. Paper clip static samples for the Chemigum N6B/PVC blends are shown in Figures 6A, 6B and 6C and illustrate the improvements in ozone resistance as fluxing temperature increased.

Modification with PVC Resin

Most types of NBR polymers were successfully modified with PVC to improve ozone resistance. A variety of NBR polymers are available which differ in acrylonitrile content, polymerization temperature and processing properties. Resultant compounded vulcanizates vary in degree of oil and fuel resistance, low temperature flexibility and other physical properties. Several of the available NBR polymers as listed in Table IV were modified with PVC resin to evaluate effect on physical properties and ozone resistance. The basic formulation, used, is listed in Table IV as "A." 70/30 blends of the NBR and PVC were prefluxed to 360°F. in the laboratory Banbury. A medium viscosity PVC resin, Pliovic S-70, was used with each of the NBR polymers. NBR/PVC blends in formulation A were compared with the same NBR polymers in unmodified formulation B, which was adjusted to a similar hardness by reducing plasticizer levels.

Comparisons of the compounded properties of the two formulations for the various NBR polymers are tabulated in Tables VA and VB. NBR/PVC compounds had improved tensile properties, oven aging elongation retentions, oil and fuel resistances and abra-

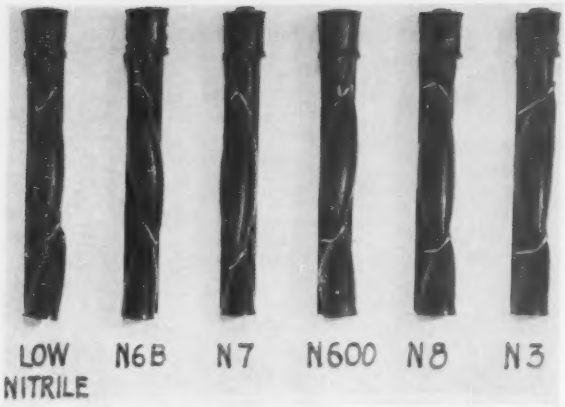

FIG. 7—The severity of cracking of the unmodified Chemigum NBR compounds: Formula B, no Pliovic.

sion resistances over the B type compounds containing the same unmodified NBR polymer. Despite the thermoplastic nature of the PVC portion, the NBR/PVC compounds had equivalent or better low temperature properties compared to similar unmodified NBR compounds. However, compression set properties of the NBR/PVC compounds were higher than the non-modified NBR compounds.

With the exception of the low acrylonitrile content NBR polymer and Chemigum N-8, the NBR/PVC compounds had excellent ozone and weathering resistance when compared to the B compounds without PVC. The low acrylonitrile NBR/PVC compound failed the dynamic and paper clip ozone tests, probably because of lower compatibility with PVC. The Chemigum N-8/S-70 compound failed the paper clip test. It was previously pointed out that a higher molecular weight PVC resin was necessary to protect Chemigum N-8. Note the severity of the paper clip test which was run for 354 hours at 100 pphm ozone. Figure 7 shows the severity of cracking of the unmodified NBR compounds. All samples showed initial cracking within 4 hours exposure. Figure 8 shows the vastly improved ozone resistance of the NBR/PVC compounds under the same conditions.

Modifications of NBR

Higher molecular weight PVC resins were more effective with some types of NBR polymers. Using the basic formulation A in Table IV, PVC resins varying in inherent viscosity and processing temperature ranges were evaluated in prefluxed blends with medium and high acrylonitrile content NBR polymers. Descriptions of the PVC resins are listed in Table IV.

TABLE Va—MODIFICATION OF A RANGE OF ACRYLONITRILE CONTENT NBR POLYMERS WITH PLIOVIC S-70. COMPOUNDED PROPERTIES

	NBR					
	Low Nitrile		N6B		N-3	
Chemigum Formulation	A	B	A	B	A	B
ML4-212° F.	50	62	35	44	59	70
Tensile, psi	2250	2075	2500	2325	3100	2650
300% Modulus, psi	1590	—	1225	1750	1825	2425
% Elongation	415	290	530	400	470	330
Shore A Hardness	68	65	65	64	69	71
NBS Abrasion Index	262	222	219	163	356	304
Low Temperature Properties						
ASTM D-746, °C.	−61	−64	−46	−43	−36	−28
ASTM D-1053 T_{100}, °C.	−20	−12.5	−12.5	− 6.5	+ 3.5	+ 2.5
Oven Aging, 70 hrs/212° F.						
% Elongation Change	−20.2	−27.7	−22.7	−36.6	−20.0	−30.0
Compression Set B, 22 hrs at 158° F.						
Cured 35′/310° F., %	27.5	7.7	31.1	9.3	28.6	8.2
ASTM No. 3 Oil, 70 hrs/212° F.						
% Swell	+16.7	+26.3	+ 3.5	+12.7	− 4.1	+ 5.0
Ref Fuel B, 70 hrs/R T						
% Swell	+26.2	+38.1	+18.0	+25.3	+15.6	+16.8
OREC Ozone Resistance, 100° F., 50 pphm Ozone, 144 hrs. Cracking						
Static	None	Fine	None	Fine	None	Fine
Dynamic (30 Flexes/min)	Fine	Fine	None	Fine	None	Fine
Paper Clip Samples, 100° F., 100 pphm ozone, 354 hours						
Cracking	Severe	Severe	None	Severe	Few	Severe
Weathering, 5 months, static wedge						
Rating	0/0	4/4	0/0	4/4	0/0	4/4

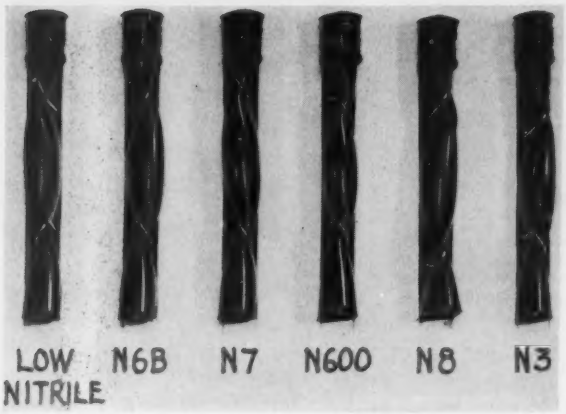

FIG. 8—Improved ozone resistance of the NBR 70/30 Pliovic S-70 blended compounds after 354 hours at 100 pphm ozone, the same conditions as were used to test samples shown in Figure 7 on the previous page.

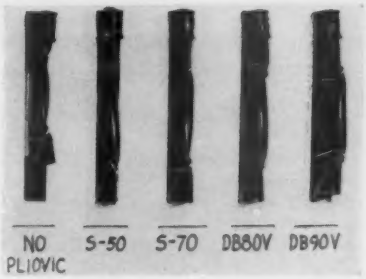

FIG. 9—Paper clip samples show ozone resistance of Formula A, N600/Pliovic, 70/30 blends. Control is on left.

Physical properties and results of ozone aging for the medium acrylonitrile content NBR/PVC blends are tabulated in Table VI. An unmodified NBR compound was used for comparison purposes based on Formulation B in Table IV. As inherent viscosities of the PVC resins increased, modulus, Mooney viscosity, tear and abrasion resistance increased. Under the test conditions, none of the NBR/PVC blends were attacked by ozone. Figure 9 shows the paper clip samples. The superior ozone resistance of the PVC/NBR compounds over the unmodified control was apparent.

Table VII contains data on the high-acrylonitrile-content NBR modified with the same series of PVC resins. Effects of the increased inherent viscosity resins on physical properties were similar to the previous series with the medium acrylonitrile NBR. Ozone

TABLE Vb—MODIFICATION OF VARIOUS MEDIUM ACRYLONITRILE NBR POLYMERS WITH PLIOVIC S-70. COMPOUNDED PROPERTIES

	NBR					
	N7		N600		N8	
Chemigum Formulation	A	B	A	B	A	B
ML4-212° F.	53	66	45	56	79	86
Tensile, psi	2775	2210	2750	2625	2475	1900
300% Modulus, psi	1450	2100	1175	1800	1700	—
% Elongation	510	315	605	435	430	260
Shore A Hardness	65	67	65	66	67	70
NBS Abrasion Index	297	204	396	348	259	152
Low Temp Properties						
ASTM D-746, °C.	−51	−47	−43	−43	−41	−40
ASTM D-1053 T_{100}, °C.	−14	− 6.5	−11	− 6	−13.5	− 5
Oven Aging, 70 hrs/212° F.						
% Elongation Change	−18.9	−23.8	−22.2	−36.9	−17.8	−18.5
Compression Set B, 22 hrs/158° F.						
Cured 35′/310° F., %	29.0	7.6	33.3	8.3	28.3	8.5
ASTM No. 3 Oil, 70 hrs./212° F.						
% Swell	+ 2.2	+12.0	+ 2.9	+13.8	+ 3.7	+13.5
Ref. Fuel B, 70 hours/R. T.						
% Swell	+17.3	+25.7	+16.4	+27.0	+17.1	+24.7
OREC Ozone Resistance, 100° F., 50 pphm Ozone, 144 hrs, Cracking						
Static	None	Fine	None	Fine	None	Fine
Dynamic (30 Flexes/min)	None	Fine	None	Fine	None	Fine
Paper Clip Samples, 100° F., 100 pphm Ozone, 354 hours						
Cracking	None	Severe	None	Severe	A few	Severe
Weathering, 5 months, Static Wedge						
Rating	0/0	4/4	0/0	4/4	0/0	4/4

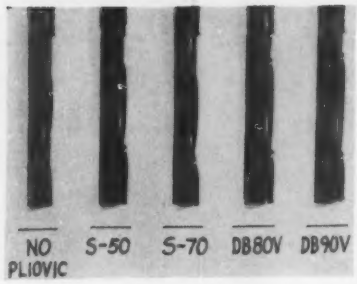

FIG. 10—Paper clip test samples of Formula A, N3/Pliovic, 70/30, after ozone tests. Higher viscosity PVC resins provide better ozone protection for the high acrylonitrile NBR polymer.

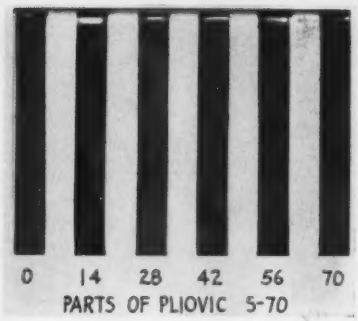

FIG. 11—Dynamic ozone aged samples (Mast Ozone Box, 144 hours, 50 pphm ozone, 100°F., 10 per cent stretch) for various levels of the medium viscosity resin.

aging data indicated that higher viscosity PVC resins provide better ozone protection for the high acrylonitrile NBR polymer. Resins, DB80V and DB90V which have a medium or high molecular weight were required. Paper clip test samples shown in Figure 10 illustrate this point.

Higher Levels of PVC Resin

Increasing the per cent of PVC should improve the ozone resistance of the NBR/PVC blend. Because the previous data indicated that lower molecular weight PVC resins were less effective in ozone protection, the effect of increasing the amounts of these PVC resins was investigated. The basic formulation used in Table II was employed with some changes. Levels of PVC resins, stabilizers and plasticizers were varied. Pliovic S-50, low molecular weight PVC, and Pliovic S-70, medium molecular weight PVC, were each blended with a medium acrylonitrile NBR, Chemigum N-600. PVC resin levels were varied from 0 to 70 parts with appropriate adjustments in levels of plasticizers to maintain a similar hardness.

Data and compound variations are listed in Table VIII. Lower ozone protection from the lower molecular weight PVC resin was reconfirmed. Static protection required 42 parts and dynamic protection required 70 parts of PVC. The medium molecular weight resin, S-70, had good static ozone resistance at 28 parts and good dynamic resistance at 42 parts. Figure 11 shows the dynamic ozone aged samples for various levels of the medium viscosity resin.

Type and Amounts of Fillers

Type of fillers did not significantly affect ozone resistance of NBR/PVC blends. A number of carbon blacks and light colored fillers were evaluated in an

TABLE VI—MODIFICATION OF A MEDIUM ACRYLONITRILE NBR (CHEMIGUM N600) WITH VARIOUS PVC RESINS, COMPOUNDED PROPERTIES

Formula,	A					B
Pliovic PVC Resin ...	S-50	S-70	DB80V	DB90V	W	No PVC
ML4—212° F.	40	44	45	48	45	52
Tensile, psi	2840	2850	2850	2775	2625	2675
300% Modulus, psi..	1075	1200	1250	1310	1300	1725
% Elongation	635	610	590	570	560	450
Shore A Hardness ...	66	67	68	68	68	66
Crescent Tear, Die B	258	257	276	270	254	169
NBS Abrasion Index	317	420	438	510	459	349
OREC Ozone Aging, 100° F., 10% Strain, 144 hours, 50 pphm Ozone, Cracking						
Static	None	None	None	None	None	Severe
Dynamic (30 Flexes/min) ..	None	None	None	None	None	Fine
Paper Clip Samples, 100 pphm Ozone, 100° F., 354 hours						
Cracking	None	None	None	None	None	Severe
Weathering, 5 months, Static Wedge						
Rating	0/0	0/0	0/0	0/0	0/0	4/7
Cured 20 minutes at 310° F.						

TABLE VII—MODIFICATION OF HIGH ACRYLONITRILE NBR (CHEMIGUM N3) WITH VARIOUS PVC RESINS. COMPOUNDED PROPERTIES

Formula,	A					B
Pliovic PVC Resin ...	S-50	S-70	DB80V	DB90V	W	No PVC
ML4—212° F.	53	56	60	63	61	44
Tensile, psi	2975	3000	2875	3100	3050	2625
300% Modulus, psi..	1625	1875	1975	2175	2125	2550
% Elongation	490	465	430	430	430	310
Shore A Hardness ...	70	70	71	73	72	72
Crescent Tear, Die B	286	305	278	268	270	172
NBS Abrasion Index	385	475	542	628	619	333
OREC Ozone Aging, 100° F., 10% Strain, 144 hours, 50 pphm Ozone, Cracking						
Static	Fine	None	None	None	None	Severe
Dynamic (30 Flexes/min) ..	Severe	Slight	None	None	None	Severe
Paper Clip Samples, 100 pphm Ozone, 100° F., 354 hours						
Cracking	Severe	Fine	None	None	None	Severe
Weathering, 5 months, Static Wedge						
Rating	0/0	0/0	0/0	0/0	0/0	4/5

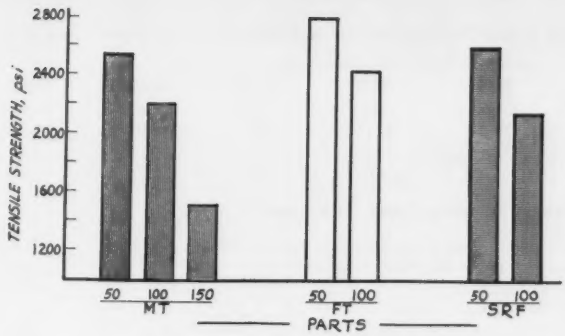

FIG. 12—Pigmentation study, NBR/PVC, MT, FT, and SRF black, showing tensile strengths.

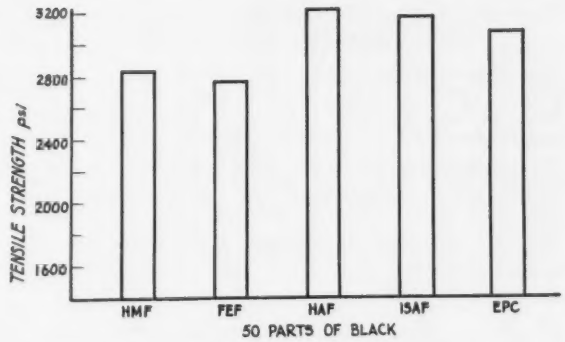

FIG. 13—Tensile strengths of 67/33 NBR/PVC blend reinforced with carbon blacks of various types.

NBR/PVC blend, which consisted of a 67/33 ratio of a medium acrylonitrile NBR and a medium molecular weight resin prefluxed to 360°F. The basic formulation is shown in Table IX. Table X shows the effects of 50 parts of various carbon blacks. Under test conditions ozone resistance was not affected by type of carbon black. Dynamic weathering tests indicated that the large particle size blacks, MT and FT, imparted better weathering resistance than the finer particle blacks. Tensile strengths available from the various blacks in the NBR/PVC blend are shown in Figures 12 and 13.

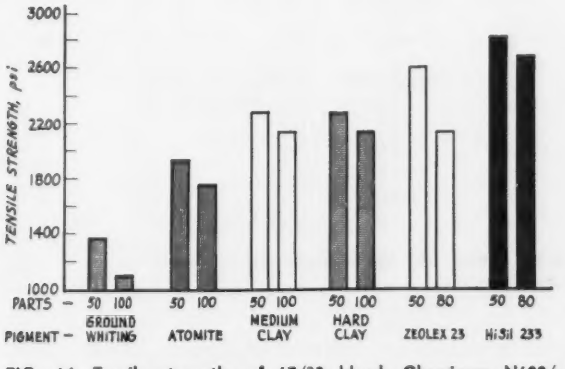

FIG. 14—Tensile strengths of 67/33 blend, Chemigum N600/Pliovic S-70 reinforced with light colored pigments.

TABLE VIII—EFFECT OF INCREASING THE AMOUNTS OF LOW MOLECULAR WEIGHT PVC RESINS

BASIC FORMULATION IN TABLE II

	Formulation Variations					
Parts Resin	0	14	28	42	56	70
Total Stabilizers	0	.42	.84	1.26	1.68	2.10
Total Plasticizers	0	7.0	14.0	22.0	28.0	36.0
Pliovic S-50						
Tensile, psi	2725	2675	2675	2500	2050	1750
300% Modulus, psi	1825	1225	950	800	700	675
Shore A Hardness	66	63	63	63	63	64
Ozone Box Aging, Mast, 100° F., 10% Strain, 144 hours 50 pphm						
Static	Severe	Severe	Severe	None	None	None
Dynamic 60 Flexes/min.	Severe	Severe	Severe	Severe	Severe	None
Pliovic S-70						
Tensile, psi	2725	2775	2750	2525	2275	1875
300% Modulus, psi	1825	1300	1000	850	850	850
Shore A Hardness	66	64	63	63	63	64
Ozone Box Aging, Mast, 100° F., 10% Strain, 144 hrs, 50 pphm						
Static	Severe	Severe	None	None	None	None
Dynamic 60 Flexes/min.	Severe	Severe	Severe	None	None	None

Data evaluating 50 parts of light colored pigments is tabulated in Table XI. Variations in light colored pigment type did not affect the ozone and weathering resistance as tested. Tensile strength for the various fillers are indicated in Figure 14. Light colored ozone

TABLE IX—EVALUATION OF VARIOUS PIGMENTS IN A 67/33 NBR/PVC BLEND

Basic Formulation

Chemigum N600	100.00	Prefluxed 360° F.
Pliovic S-70	50.00	
Mark XI[1]	1.00	
Mark XX[1]	.50	
Zinc Oxide	3.00	
Stearic Acid	1.00	
Pigment (As Indicated)	50 to 150.00	
Plasticizer SC[2]	15.00	
KP 140[2]	15.00	
Amax[4]	1.50	
Unads[4]	Black .25, Light .40	
Sulfur	1.50	

Blacks Cured 20 min. at 310° F.

Light Pigments 15 min. at 310° F.

(1) Argus Chemical
(2) Harwick Standard Chemical
(3) Ohio-Apex
(4) R. T. Vanderbilt

Table X—Comparison of 50 Part Loadings of Carbon Blacks in a NBR/PVC Blend

Black	MT	FT	SRF	FEF	HMF	HAF	ISAF	EPC
ML4-212° F.	39	38	41	45	44	49	47	46
NBS Abrasion Index	327	310	317	296	291	301	308	341
Crescent Tear, Die B	240	229	337	326	328	319	315	374
Shore A Hardness	60	63	66	70	68	72	72	69
OREC Ozone Aging, 100° F., 10% Strain, 50 pphm Ozone, 168 hours								
Static	None →							
Dynamic (30 Flexes/min.)	None →							
Weathering, 6 Months								
Static, Rating	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Dynamic, 5 Months Rating	2/1	2/2	3/3	3/6	3/5	3/5	4/6	3/3

Table XI—Comparison of 50 Part Loadings of Light Pigments in a NBR/PVC Blend

Pigment	Ground Whiting	Atomite[1]	Soft Clay	Hard Clay	Zeolex[2] 23	Hisil[3] 233
ML4—212° F.	32	33	32	34	51	70
NBS Abrasion Index	58	103	58	73	91	138
Crescent Tear, Die B	105	106	138	149	201	319
Shore A Hardness	54	54	58	59	64	69
Orec Ozone Aging, 100° F., 10% Strain, 50 pphm Ozone, 168 hours						
Static	No Cracking →					
Dynamic (30 Flexes/min.)	No Cracking →					
Weathering, 4 Months						
Static Wedge	Slight Crazing →					

(1) Thompson-Weinman
(2) J. M. Huber
(3) Columbia-Southern

Table XII—Formulation For Evaluating Plasticizers in a NBR/PVC Blend

Chemigum N600[3]	100.00
Pliovic S-70[3]	50.00
Mark XI[1]	1.00
Mark XX[1]	.50
Zinc Oxide	3.00
Stearic Acid	1.00
SRF Black	50.00
Amax[2]	1.50
Unads[2]	.25
Sulfur	1.50
Plasticizer (As Indicated)	30.00
	238.75

Prefluxed 360° F.

Test Specimens Cured 20 min. at 310° F.

(1) Argus Chemical
(2) R. T. Vanderbilt
(3) Goodyear Chemical

Table XIII—Various Plasticizers in a NBR/PVC Blend. Compounded Properties

Plasticizer	Tensile psi	Shore A Hardness	ML4-212°F.	ASTM D-746, °C.	ASTM D-1053 T_{100}, °C.	% Wt Loss 70 hrs 212°F.	Ref Fuel B 70 hrs R. T. % Swell	ASTM #3 Oil 70 hrs/212°F. % Swell	Dynamic Weathering Rating, 3 Mo.
Dioctyl Phthlate	2650	68	44	—40	+ 2	2.62	+19.3	+ 1.9	0/0
Dibutyl Phthlate	2560	68	44	—42	+ 3.5	10.50	+20.0	+ 4.6	1/1
Di-isooctyl Sebacate	2600	64	40	—59	— 5	1.61	+23.4	+ .62	4/4
Di-isodecyl Phthlate	2625	67	43	—42	+ 4	.74	+22.7	+ 2.2	0/0
Dibutyl Sebacate	2600	70	48	—34	— 1	1.27	+19.6	+ 4.8	0/0
Plasticizer SC[4]	2650	65	38	—51	— 9.5	2.16	+17.4	+ 2.2	2/2
Plastokin 9058[2]	2650	64	38	—58	—15.5	2.95	+20.5	— 1.2	3/3
Sythetics L1[3]	2000	62	34	—63	— 6.5	9.38	+23.6	+ 4.8	1/1
Morphlex X1088[4]	2500	65	40	—51	—11	2.55	+18.9	+ .62	2/2
Paraplex G-62[5]	2650	66	45	—44	— 8	.98	+31.1	+10.2	0/0
Paraplex G-53[5]	2850	71	53	—36	— 4	.47	+33.7	+13.2	Broke Grip
TP-90B[6]	2475	64	35	—51	— 8	10.05	+18.6	+ 4.5	4/4
KP 140[7]	2590	64	39	—45	—19	3.10	+18.9	+ 3.1	4/3
Trioctyl/Phosphate	2600	63	38	—56	—10	5.53	+27.5	— .31	4/3
Monoplex S-71[8]	2575	63	37	—52	— 6	3.25	+22.9	+ 1.6	3/3
Santicizer M-17[9]	2725	69	46	—33	+ 1.5	10.33	+25.7	+ 6.8	0/0
Tributyl Citrate	2175	65	42	—39	— 7	8.43	+19.1	+ 2.5	0/0
Chlorowax 40[9]	2725	73	50	—40	+ 3	.55	+28.1	+ 5.4	Broke Grip

OREC Ozone Aging, 100° F., 10% Strain, 50 pphm Ozone, 168 hours, Static and Dynamic No Cracking on any samples.

(1) Harwick Standard Chemical; (2) Emery Industries; (3) Hercules Powder; (4) Morton-Withers; (5) Rohm and Haas; (6) Thiokol; (7) Ohio-Apex; (8) Monsanto; (9) Diamond Alkali.

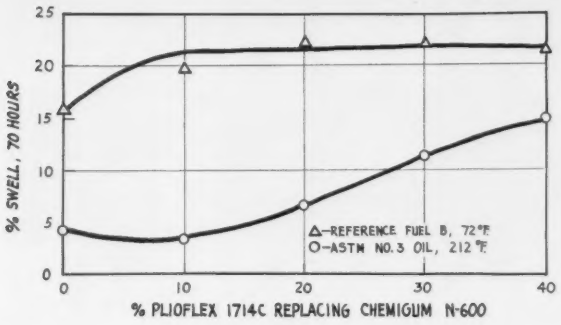

FIG. 15—Oil and fuel volume swell of Chemigum N600/Plioflex 1714C/Pliovic S-70.

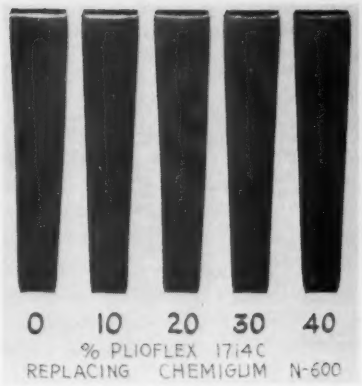

FIG. 16—Results of roof aging tests (two months, dynamic) show an increase in cracking as the SBR 1714 per cent increased.

resistant compounds were produced which did not require staining and discoloring antiozonants for ozone protection. These materials are normally necessary to improve the ozone resistance of NR, SBR and polychloroprene.

TABLE XIV—PARTIAL REPLACEMENT OF NBR WITH SBR 1714 IN A NBR/PVC BLEND FORMULATION

Chemigum N600 As Indicated	100.00	Prefluxed 360° F.
Plioflex 1714C As Indicated	——	
Pliovic S-70	50.00	
Mark XI[1]	1.00	
Mark XX[1]	.50	
Zinc Oxide	3.00	
Stearic Acid	1.00	
SRF Black	50.00	
KP 140[2]	15.00	
Plasticizer SC[3]	15.00	
Amax[4]	1.50	
Unads[4]	.25	
Sulfur	1.50	
	238.75	

Parts Chemigum N600	100.00	90.00	80.00	70.00	60.00
Parts Plioflex 1714C	0.0	10.00	20.00	30.00	40.00
ML 4—212° F.	40	37	35	34	32
Tensile, psi	2525	2350	2500	2400	2125
300% Modulus	1000	1025	1060	1100	1075
% Elongation	680	645	650	625	590
Shore A Hardness	64	64	63	63	63
NBS Abrasion Index	378	350	294	290	244
ASTM D-746, °C.	—51	—52	—54	—53	—53
ASTM D-1053 T_{100}, °C.	— 8	—10.5	— 9	—13	—13.5

OREC Ozone Box, 100° F., 10% Strain, 169 hours, 50 pphm Ozone

Static	No Cracking →				
Dynamic (30 Flexes/min.)	No Cracking →				

Weathering, 3 Months

Static	No Cracking →				
Dynamic, Rating	2/2	3/2	3/2	3/3	4/3

(1) Argus Chemical
(2) Ohio-Apex
(3) Harwick-Standard Chemical
(4) R. T. Vanderbilt

Effect of Plasticizers

Plasticizer type did not significantly affect the ozone resistance of NBR/PVC vulcanizates. A large number of plasticizers are available for use in NBR and PVC resin compounding. Choice of plasticizer will affect hardness, processability, low temperature properties, flame resistance, extraction by oils and fuels, costs and volatility on aging. Several plasticizers were evaluated at a 30 part level in the basic formulation in Table XII. Typical compounded properties are summarized in Table XIII. Low temperature brittle points ranged from —34 to —63°F. Low temperature brittle points did not necessarily correlate with the torsional stiffness T_{100} temperatures. Static and dynamic ozone testing and static weathering tests did not show any differences in aging between the plasticizers. Dynamic weathering tests indicated some differences in cracking. None of the plasticizers showed any bleeding in cured sheets at the 30 part level after 6 months shelf aging.

Addition of SBR to NBR/PVC Blends

Costs of NBR/PVC blends can be considerably reduced by the addition of SBR. SBR is added to NBR compounds to improve low temperature properties, increase swell in oils and reduce costs. A blend of varying amounts of NBR and SBR 1714 were modified with PVC by fluxing in a laboratory Banbury to 360°F. SBR 1714 is a 50 part aromatic oil-extended SBR polymer. Blends were compounded in the basic formulation in Table XIV. As the SBR 1714 level was increased, tensile properties did not change significantly, abrasion resistance decreased and low temperature properties improved slightly.

ASTM No. 3 oil and Reference Fuel B swell values are indicated in Figure 15. The Reference Fuel B swell values leveled off at 20 parts of SBR 1714. The ASTM No. 3 oil swell values showed a gradual increase as the level of SBR 1714 increased. Extraction of the extending oil used in the SBR 1714 undoubtedly affected the swell values. Dynamic

TABLE XV—CHEMIVIC 400 VERSUS POLYCHLOROPRENE AND NBR

Formulations

Chemivic 400[1]	144.00	——	Neoprene W[2]	100.00
Chemigum N600[1]	——	100.00	Zinc Oxide	5.00
Zinc Oxide	3.00	3.00	Stearic Acid	.50
Stearic Acid	1.00	1.00	Lt Mag Oxide	4.00
Di-isooctyl Sebacate	25.00	5.00	SRF Black	44.00
SRF Black	50.00	50.00	Thermoflex A[3]	3.00
Agerite Resin D[2]	2.00	2.00	Neozone A[2]	2.00
Amax[3]	1.50	1.50	NA-22[3]	.50
Unads[3]	.25	.25		159.00
Sulfur	1.50	1.50		
	228.55	164.25		

Compounded Properties, Cured 20 min. at 307° F.

	NBR	Chemivic 400	Polychloroprene
ML4-212° F.	49	40	62
Tensile, psi	2360	2825	2940
300% Modulus, psi	1700	1150	2100
% Elongation	410	630	540
Shore A Hardness	66	66	65
Crescent Tear, lbs/in	139	206	173
ASTM D-746, °C.	—46	—48	—41
Bureau of Standards Abrasion Index	374	459	156
ASTM No. 2 Oil Aging, 18 hrs. at 250° F.			
% Swell	+ 3.1	— 7.3	+40.9
% Elongation Change	—17.1	—15.0	—16.3
ASTM No. 3 Oil Aging, 70 hours at 212° F.			
% Swell	+12.5	+ 1.2	+80.7
% Elongation Change	—24.4	—19.7	—40.7
Reference Fuel B, 70 hrs. at R. T.			
% Swell	+30.8	+26.0	+72.5
% Elongation Change	—43.8	—21.3	—48.8
OREC Ozone Box Aging, 100° F., 336 hours, 100 pphm			
Static	Cracking	None	None
Dynamic (30 Flexes/min.)	Cracking	None	None
Paper Clip	Cracking	None	None
ASTM D-1171 Triangular Wedge	Cracking	None	None

Cured 20 min. at 307° F.

(1) Goodyear Chemical Division
(2) R. T. Vanderbilt
(3) DuPont

TABLE XVI—CHEMIVIC VERSUS COMPETITIVE NBR/PVC BLENDS FORMULATIONS

NBR/PVC Blend	100.00
Zinc Oxide	3.00
Stearic Acid	.50
SRF Black	50.00
Plasticizer SC[1]	10.00
Plasticizer KP-140[2]	10.00
Amax[3]	1.00
Unads[3]	.20
Sulfur	1.00
	175.70

Compounded Properties, Cured 30 min. at 307° F.

	Chemivic[4]		Competitor	
	400	800	A	B
ML4-212° F.	43	62	36	55
Tensile, psi	2250	2300	2100	2250
300% modulus, psi	1500	1725	1475	1475
% Elongation	540	480	490	520
Shore A Hardness	70	71	70	68
Crescent tear, lbs./in.	254	191	195	162
Low temperature, ASTM D-746, °C.	—39	—44	—56	—52
Bureau of Standards Abrasion Index	357	332	346	248
% Mill Shrinkage	—27.1	—12.2	—28.1	—26.3
ASTM No. 2 Oil Aging, 18 hours at 250° F.				
% Swell	— 6.7	— 6.4	— 3.1	— .6
% Elongation Change	— 7.4	— 2.4	—13.5	—10.0
ASTM No. 3 Oil Aging, 70 hours at 212° F.				
% Swell	+ .6	+ 1.8	+ 8.0	+12.9
% Elongation Change	— 9.3	— 4.8	— 9.6	—16.0
Reference Fuel B, 70 hours at R. T. 74° F.				
% Swell	+17.4	+17.0	+21.0	+25.7
% Elongation Change	—11.1	—19.0	—19.2	—30.0

Mast Ozone Box, 100° F., 50 pphm, 92 hours

Paper Clip Specimen	No cracking	No cracking	1 large crack	Severe deep cracks

(1) Harwick Standard Chemical
(2) Ohio-Apex
(3) R. T. Vanderbilt
(4) Goodyear Chemical Division

weathering samples, showing an increase in cracking as the SBR 1714 increased, are shown in Figure 16. Ozone testing did not show any differences as the per cent of SBR increased.

NBR/PVC Blends vs. Polychloroprene

Compared to polychloroprene, NBR/PVC vulcanizates have improved oil resistance with satisfactory ozone resistance. Chemivic 400 is a recently introduced prefluxed NBR/PVC elastomer blend. In Table XV it is compared in compounded properties cellent ozone resistance *(11)* and an unmodified NBR to a polychloroprene compound reported to have excompound. The Chemivic 400 compound had superior abrasion, oil and fuel resistance. Both the Chemivic 400 and polychloroprene compounds had excellent ozone resistance. The static test samples are shown in Figure 17. Included in the static ozone tests were ASTM D1171 triangular cross-section test specimens.

NBR/PVC Elastomer Blends

In addition to Chemivic 400 and Chemivic 800, several other NBR/PVC blends are offered commercially. In Table XVI the Chemivic elastomers are compared to two competitive materials in an SRF black loaded formulation. The Chemivic compounds had better oil and fuel resistance, improved ozone resistance, and slightly higher low temperature brittle points. The paper clip exposed test specimens are shown in Figure 18. Differences noted are attributed to variations in acrylonitrile content of the NBR poly-

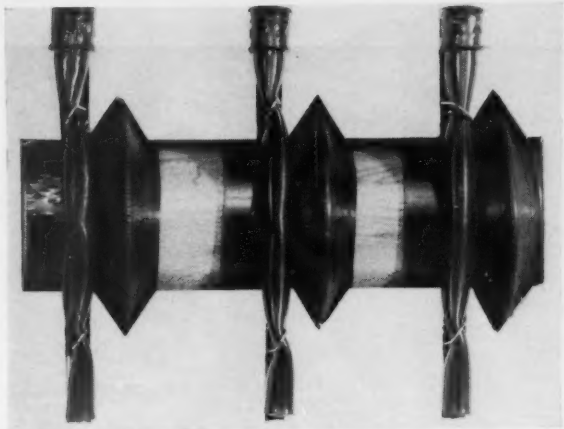

FIG. 17—Static test samples show the comparative ozone resistance of Chemigum, left, Chemivic 400, center, and polychloroprene compound, right.

FIG. 18—Paper clip exposed test specimens of two Chemivic elastomers, and two competitive materials in an SRF black-loaded formulation (Mast Ozone Box, 100°F., 50 pphm ozone, 92 hours).

mers and other inherent variations in materials and manufacturing techniques.

Applications of NBR/PVC Vulcanizates

Properties of NBR/PVC vulcanizates suggest their usage in those applications requiring excellent oil and fuel resistance coupled with exceptional ozone and weathering resistance. Such applications would include wire and cable jackets, weather stripping, conveyor belts, hose and fuel line jackets and coated fabrics. Light colored, ozone resistant vulcanizates are possible with good color retention on aging. Military sources are interested in the high abrasion resistance of NBR/PVC compounds in shoe soling applications *(12)*. An additional advantage is improved flame resistance which may be augmented by proper choice of plasticizers and compounding materials. This is another area in which NBR polymers have been at a disadvantage to polychloroprene in some applications.

Synopsis and Conclusions

Ozone resistances of most types of acrylonitrile-butadiene polymers were vastly improved by modifying the NBR polymers with polyvinyl chloride resins. NBR/PVC resin blends must be adequately fluxed at a temperature dependent on the molecular weight and resultant fluxing temperature of the PVC resin to develop optimum properties.

Improvements in ozone resistance by modification with PVC resin were more pronounced in the high and medium acrylonitrile NBR polymers than in a low acrylonitrile NBR. Higher molecular weight PVC resins were required for optimum ozone protection of the high acrylonitrile NBR.

While easier to flux and process, a low molecular weight PVC resin was not as effective in ozone protection as the higher molecular weight PVC resins.

Conventional compounding variables such as different types and amounts of fillers and plasticizers did not detract from the ozone resistant properties of NBR/PVC blends under normal ozone testing.

If they meet the specific properties required, commercial prefluxed elastomer blends of NBR and PVC are more convenient to use.

With the exception of compression sets, the normal qualities and physical properties associated with NBR vulcanizates were maintained or improved.

Modification of NBR with PVC produces ozone-resistant vulcanizates which extend the usage of NBR polymers into areas of applications normally relegated to the less oil-resistant but more ozone-resistant polychloroprenes.

Acknowledgment

The author wishes to thank The Goodyear Tire & Rubber Company for permission to submit this paper.

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FIG. 1—Springday V-belt plant employee places bin of black on one of six tilting discharge stations. Air-actuated tilts tip bins to 45° angle. As material flows out it is moved via screw conveyor to hopper, to slider belt conveyor and thence to the Banbury.

Handling Carbon Blacks in Bulk

A materials handling system engineered for the V-belt plant of Springday Company

WHILE plans for the V-belt plant built by Springday Company at Springfield, Mo., were still being drawn, engineers were working out the solutions to three problems that would be encountered in the plant's operation. These problems, typical to firms which use carbon black, involve (1) handling —particularly the dust problem, (2) purchasing—usual 50 pound multiwall bags require multiple handling costs, plus the container cost itself, and (3) stocking—large inventories, although common to the industry, represent capital tied up.

The Alternatives

In developing a solution, the Springday engineers first considered bulk hopper cars from which the black could be blown or sucked into silos for storage. This was rejected because of the inherent dustiness of the method, and because of the quantities of diverse blacks that would be required to utilize the silos to advantage.

Containerization, the system eventually chosen for handling the three most frequently used blacks, was then explored. It was found that tote bins, made by Tote Systems, Inc., would, in effect, be large enough to provide substantial disposable container costs, small enough to be versatile, and in practice, portable. Fifty aluminum bins—each with a 110 cubic foot capacity capable of holding from 1 to 1½ tons of black—were specified.

With the assistance of a Tote engineer, the container system, including the bins, discharge stations (shown in Figure 1, above), and an automatic Howe Batch Master control system, were installed before start-up of the plant.

In operation, the aluminum containers, filled, are hauled 12 at a time by flatbed truck from Texas suppliers to the Springfield, Mo. plant. One man with a fork truck unloads them and reloads empties in three hours. As storage containers, the bins hold the various blacks until needed by production.

When called for, they are fork-lifted to the discharge station whose six tilts make it possible to intermix blacks, or to store them between runs. The panel actuated control system introduces the blacks to the Tote fabricated weigh hopper, which then discharges predetermined amounts of material to the Banbury. Partially emptied bins can be lowered back to a level position when the black is not being used.

Cleanliness, economy, and inventory control have all been achieved, according to company officials, by the solution worked out by the engineers.

Slippery Rubber

Promising research now being carried on to develop a high lubricity rubber for military uses also evinces a bright future for numerous commercial applications

By C. M. DOEDE

President, Quantum, Inc.
Wallingford, Connecticut

IN most applications, the high coefficient of friction of rubber is a useful property, as important, or nearly as important, as rubber's elasticity. In some uses, however, elasticity is the primary requirement and a high coefficient of friction is a negative factor.

An example is the O-ring used to create a fluid-tight seal around a rotating shaft. Here the need is for a material that will press tightly against the shaft and that has the resilience to conform to the shaft's shape, even in the face of imperfections and deformations. Friction has no useful function in an O-ring and only leads to wear and deterioration of the seal.

In most cases, of course, the fluid to be retained is a liquid that has lubricating properties, so that friction is radically reduced, but any friction in a shaft seal is detrimental to its service life. Also, there is always danger of loss of the lubricant, with rapid wear, destruction of the seal, and impairment of the mechanism as the likely consequence. In addition, in certain systems it may be necessary to retain a gas, in which case special provisions must be made for lubricating O-rings or other packings. Ideally, all such seals should be able to function for long periods of time without any applied lubricants, both as insurance against damaging wear and as a safeguard to the mechanism in the event that the lubricant is lost. A rubber or elastomeric material with a very low coefficient of friction is obviously called for as an approach toward this ideal.

As soon as one envisions a rubber with a low coefficient of friction as a speculative possibility, he immediately foresees other potential uses for such a material. A "frictionless" rubber, for instance, should be an excellent material for ball and plug valves. Possibly, friction is the greatest cause of leaky household faucets and all the attendant nuisance repairs. Certainly, a sizable market would immediately exist if one could come up with a near-frictionless faucet valve washer and valve stem packing that had ample resilience to insure closure. Also a "frictionless"—or to put it more accurately, a high-lubricity—rubber should have use as a light-duty bearing and should have advantages over plastic bearings in ap-

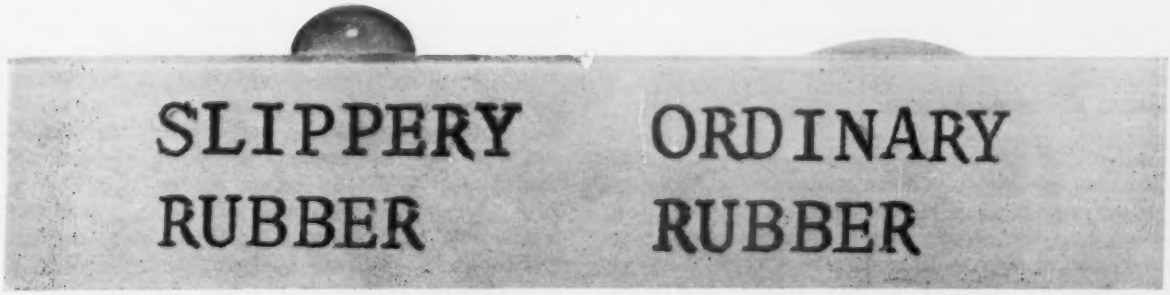

FIG. 1—Illustrated is the difference in the contact angle of wetting by water. The contact angle for plain rubber was 78°, while the contact angle for slippery rubber was 101° (contact angle for Teflon is 104°). The contact angle and coefficient of friction are related, since both are functions of the surface free energy of the rubber.

The Research Problem

"The goal should be retention of the base composition to assure elasticity, tensile strength, and tear resistance, but development of lubricity as an integral, molecular feature of the surface."

plications where the self-alignment and vibration-damping qualities made possible by the elasticity of rubber are beneficial factors.

Then, merely by extension of thinking one can foresee tonnage use for low-friction elastomers as weather seals for windows and doors and as extruded or molded strips for sliding window and panel closure retention and sealing. Hermetically tight windows would be possible if the window units slid over a strip of highly elastic, yet near-frictionless rubber. The principle would also make possible non-stick static seals, such as hatch and bulkhead gaskets.

Many attempts have been made to develop a low-friction rubber. Usually these have involved incorporating some lubricating material into the base composition or the coating of the elastomer with a lubricant. Adding graphite, molybdenum disulfide, Teflon, or oils to the composition leads to disappointing results, mainly because sufficient additive to sustain the lubrication function causes gross loss of physical properties—reducing, for instance, tear and tensile strengths and elasticity. Similarly, superficial coatings of lubricants, such as Teflon dispersions and graphite, are quickly lost, and thus give only temporary reduction in the friction coefficient. Elastomers with superficial coatings also can have only very limited use, since they are messy to handle and unacceptable wherever soiling is a consideration.

As the result of its work with various elastomers and plastics, Quantum, Inc., became cognizant of the need for a low-friction, high-elasticity material and conceived the idea of creating a truly "slippery" rubber by a chemical surface treatment. It seemed obvious to us that the goal should be retention of the base composition to assure elasticity, tensile strength, and tear resistance, but development of lubricity as an integral, molecular feature of the surface. A way to accomplish this, we reasoned, would be to perfluorinate the surface structure, so as to achieve a surface composition similar to Teflon's.

Causes of Frictional Behavior

Before describing the chemical approach used to successfully develop slippery rubber, some discussion of the basic physical reasons for frictional behavior in elastomers and plastics may be in order. Aside from the effect of mechanical roughness, it would seem that the frictional behavior of these materials is largely due to the interaction of electrical forces between the polymer and the surface it contacts. Hydrocarbon elastomers as a class have high coefficients of frictions. Typically, the dipole forces associated with CH groups in the polymer molecule are high—as compared with CF groups—with a resultant high level of attraction between such a polymer and a contacting surface. On the other hand, perfluorinated materials exhibit lower coefficients of friction, because interatomic forces are internally balanced (low dipole moment). In demonstration of this, W. A. Zisman, of the Naval Research Laboratory, has achieved a correlation between the frictional coefficients of materials and their surface free energies. Perfluorinated materials were found to have low surface free energies and also exhibited low coefficients of friction.

Practical Applications

In practical applications, one must also consider the fact that sliding surfaces are far from smooth when considered from the standpoint of their microstructure. In the absence of film lubricants, appreciable force may be required to slide asperity over contacting asperity. This is also a factor in the coefficient of friction. Polytetrafluoroethylene functions as a low-friction material, not only because of its low surface free energy, but also because fragments of the polymer are easily torn away by micro-projections of the bearing surface, thus filling the "valleys" of the bearing surface with the polymer. Once the initial wearing away is complete, film separation of the contacting surface has been accomplished. Since the sliding action now takes place between two perfluorinated surfaces, the surface free energy is minimized and optimum reduction in friction is realized.

The effects of fluorine in the structure of a polymer in lowering frictional properties—or more aptly, of hydrogen in increasing friction—is seen in the comparison of the coefficients of friction of rubber, Viton "A", and Teflon. Unlubricated natural rubber compounds have coefficients of friction which range from 0.8 to more than 1.0 when measured against a smooth steel surface. Viton "A", a partially fluorinated polymer with one CH_2 group in the unit structure, has a coefficient of 0.50, and Teflon, a completely fluorinated polymer, a coefficient of 0.30. The presence of the two hydrogen atoms in the Viton "A" molecular unit is possibly the most significant factor contributing to the increase in the coefficient of friction over Teflon.

From these theoretical considerations, it can be seen that the complete fluorination of the surface of

rubber should give that surface a reduced coefficient of friction. The surface so produced would be chemically bonded and should have functional characteristics similar to those of Teflon. The approach envisioned by Quantum involved the following steps:

(1) Graft polymerization of chemically active monomers or oligmers to the surface of an elastomer.

(2) Subsequent conversion of the graft polymer to a fluorinated form.

The validity of this approach was demonstrated by the grafting of methyl acrylate on the surface of natural rubber, subsequent hydrolysis to the corresponding acid form, and fluorination of the acid with sulfur tetrafluoride. The use of sulfur tetrafluoride as the fluorinating agent permits controlled fluorination of certain active chemical groups, such as COOH, and, in this instance, results in a trifluorinated terminal carbon. Ultraviolet radiation was used to activate the rubber surface during grafting, and the fluorination reaction was carried out in a pressure reactor at steam temperatures.

Frictional Characteristics

Samples of rubber sheet so treated exhibited drastic reduction in frictional characteristics. Comparative tests indicated that the coefficient of friction under static load had been reduced to approximately one tenth that of the control samples, and that under dynamic load the frictional coefficient of "slippery" rubber was even less. Measurement of the contact angle of water droplets on fluorinated surfaces and untreated controls of the same elastomeric material (Figure 1) yielded the following results:

Material	Contact Angle
Natural rubber	78°
Treated surface	101° ± 5°
Teflon (literature value)	104°

A large contact angle is indicative of low surface energy, a factor, as we noted earlier, that can be correlated with low coefficients of friction (Figure 2).

It will be noted that these treated samples of rubber have a contact angle almost identical with that of Teflon. Anyone who has ever touched a piece of Teflon is acquainted with its high lubricity—its oily feel. Quite obviously, rubber with a Teflon-like surface, would seem to approach the ideal as a material for O-rings and other precision mechanism seals.

The U. S. Navy Bureau of Ships became interested in slippery rubber and now has a study under way at Quantum aimed at the development and production of "permanently lubricated elastomeric materials" which meet Bureau of Ships requirements for non-lubricated dynamic seal applications.

It is believed that in this research program, and in others that Quantum will undertake on diverse commercial product applications, even greater lubricity can be developed in elastomeric surfaces. Several techniques are being considered whereby the surface can be made "more fluorinated" than by the original process. In the new procedures, attempts will be made to produce surface conversion coatings containing a preponderance of —CF_2—CF_3 chain terminations, inasmuch as there is evidence that the CF_2 group will further enhance lubricity.

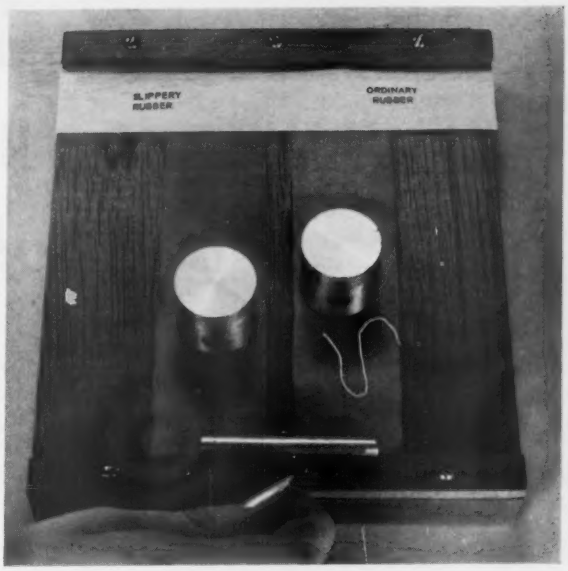

FIG. 2—The coefficient of friction is less for slippery rubber as evidenced by the smaller deflection of the spring. The spring pulling the weight over the slippery rubber is almost the same length as when unstressed.

The Potential

Much work remains to be done before the many commercial advantages of slippery rubber can be fully realized. Inasmuch as thickness of the coating, resistance to fluids, physical properties, wearability, changes in dimension, cost of treament, and other factors are influencing considerations, it is believed that slippery rubber will have to be "tailored" for most individual applications. The treatment for an aircraft engine O-ring would certainly be different from that used to mass produce, say, valve stem packings for household water systems or extrusions for weatherstripping purposes. Also, there is much work to be done in adapting the process to such materials as neoprene, butyls, silicones, and nitrile type rubbers. Cost data will have to be developed for individual applications, and these will in part determine their feasibility.

Despite the vast amount of research to be done, and the specific requirements for individual applications, no insurmountable obstacles, either technical or economic, are seen that would prevent widespread use. Even though the chemistry is fairly sophisticated, the procedures are readily amenable to commercial production. It would seem likely that the cost of treatment would be easily recovered through the value added to the product—and that many markets now closed to rubber will be opened to elastomers with near-frictionless characteristics.

An Accelerated Test for Predicting the Weatherability of Black Polyethylene

A meaningful correlation between light absorptivity and accelerated aging test results makes it possible to get an indication of weathering performance by simple means

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ONE of the principal uses for polyethylene is as an insulating material for wire and cable, frequently in outdoor installations. Therefore, resistance to outdoor weathering over long periods of time is extremely important. The best method of increasing the outdoor life of polyethylene has been found to be the addition of carbon black.

Federal Specification L-P-590 *(1)* provides the requirement that carbon black-polyethylene compositions must exhibit a minimum value of light absorptivity when measured by a specific procedure. This test is based upon the premise that the weatherability of these compositions depends upon the degree of dispersion of the carbon black which, in turn, is related to the light transmission properties of thin films prepared from these compositions. Recent studies *(2)* have shown that this test as given in the Federal Specification L-P-590 is not reliable. Therefore, the Signal Corps authorized a study to develop an improved procedure that would accurately predict the weatherability of black polyethylene.

The objective of this research was accomplished by studying the various factors that influence the measurement of the light transmission of films prepared from polyethylene compositions containing various types of carbon black. Correlation of accelerated aging data with absorptivity data resulted in a recommended procedure for predicting weatherability.

Ambrose *(3)* has stated that the addition of two per cent of carbon black increases the life of polyethylene cable sheath on overhead telephone lines from one to at least 20 years. Walder, Clarke, DeCoste, and Howard *(4)*, however, indicate that the solution to this problem is quite complex, in that the resistance to aging of a polyethylene containing a given carbon black depends upon the type and particle size of the carbon black as well as the concentration and degree of dispersion. For instance, furnace-type blacks have little value as light screens, while channel blacks greatly extend the resistance of polyethylene to degradation. This effect increases with decreasing particle size of the carbon black. Curves for attenuation of light of various wave lengths by different particle-size blacks, computed by Ambrose *(3)*, indicate that there is an optimum particle size for maximum absorption of each wave length and that this size increases with increasing wave length.

Measurement of Weatherability

The development of a procedure for prediction of the weatherability of polyethylene-carbon black compositions necessitates the determination of the relative resistance of a number of such compositions to weathering. In a short term experimental program, adoption of some form of accelerated aging becomes mandatory. No method of accelerated aging known at present can be expected to duplicate outdoor aging exactly, but a close approximation is possible in most cases.

Several methods have been used to determine the degree of degradation after various aging periods. Probably the most sensitive measure of degradation is the brittleness temperature of the aged polyethylene. Determination of a precise brittle point is precluded

Note: This paper was presented before the Meeting of the Division of Organic Coatings and Plastic Chemistry, American Chemical Society, New York, N. Y., Sept. 11 through 16, 1960.

* Now affiliated with Continental Can Co., Chicago, Ill.

because the slope of the plot of per cent brittle failures against temperature is very gradual (*4*).

Another method of following deterioration during the aging period involves tensile elongation measurements. However, it has been noted that approximately twice the aging time is required to cause a significant decrease in elongation as is required to raise the brittleness temperature appreciably. Brittleness temperature has the further advantage of being the property most directly related to the performance of the black polyethylene.

Absorptivity and Weatherability

Resistance to weathering is determined to some extent by the degree of dispersion of the carbon black in polyethylene. Measurement of light-transmission properties presents the most obvious method of determining the degree of dispersion. It has been pointed out (*5*) that Bouger's law may be applicable.

Bouger's law expresses the relationship $I = I_o e^{-\alpha x}$, where I_o = intensity of the incident light corrected for reflection losses, I = intensity of the transmitted light, α = absorption coefficient, and x = thickness of the absorbing medium. The α in this relationship should be a measure of dispersion, although it is also a prime function of absorber concentration, and of particle size in the case of carbon black.

In a proposed ASTM method (*6*), the carbon black concentration is taken into account in the absorptivity calculation, where $a = \frac{A}{bc}$, a = absorptivity, A = absorbance $= \log_{10} \frac{1}{\text{transmittance}}$, b = weight of specimen (g/cm^2), and c = concentration of carbon black (g/g).

Absorptivity, as well as weatherability, is affected to a greater extent by the more transparent areas of a film than by the areas of lower transparency. A poor dispersion of carbon black will have more areas of low concentration than a good dispersion of the same amount of black and, hence, will have a lower absorptivity. Schulken, Tamblyn, and Newland (*7*), showed that absorptivity approaches a constant value as thickness of film increases.

Methods of Measuring Absorptivity

Various methods have been proposed for the measurement of the degree of dispersion of carbon black. Visual rating using a light microscope was formerly accepted as the most reliable method. However, this type of rating could be made only by an experienced observer and was subjective by nature.

More recently, it has been shown (*8, 9*) that such ratings have little correlation with weatherability of a particular polyethylene-carbon black composition. Use of an electron microscope would allow more accurate prediction of weatherability, but involves an extremely difficult sample preparation.

A study of the method of measuring absorptivity given in Federal Specification L-P-590 (*1*), carried out by Cocks and Metzger (*2*), indicated that practically all dispersions were able to meet the requirements of the present test. In the development of a similar method, the ASTM has conducted several round-robin tests. In each case, the result has been widely scattered data, not only between laboratories, but also within a given laboratory. One difficulty was that no particular instrument, or type of instrument, was specified for use in making transmittance measurements. Another major difficulty encountered was the preparation and accurate measurement of thickness of the very thin films required. The ASTM task group accepted the method of measurement of average thickness, in terms of weight per unit area, as being most reproducible.

Schulken, Newland, and Tamblyn (*6, 7*) were the first to overcome the necessity for preparation of extremely thin films. This procedure made use of a Photovolt transmission densitometer, which is capable of measuring optical densities as high as 7.

Experimental Methods: Preparation of Dispersions

Standard Method. Good dispersions of all carbon blacks used in this investigation were prepared by a standard milling technique. For each black, one dispersion was prepared containing 2.5 g. black in 500 g. Bakelite DYNH No. 3 polyethylene, and another was prepared containing 13.7 g. black per 500 g. polyethylene. The polyethylene was banded on a 6 by 12 inch laboratory mill at 240°F. and the black added. Milling continued for 20 to 25 minutes with constant working. The dispersions used in this study are described in Table I.

Variations in Degree of Dispersion. This standard technique was varied in the preparation of compositions having different degrees of dispersion. A masterbatch containing up to 50 per cent by weight of the black was prepared on a small laboratory mill. The proper aliquot for an approximate 2.75 per cent concentration was then rolled into the banded polyethylene on the 6 by 12 inch mill. Different degrees of dispersion were realized by varying the milling time from one pass up to 3 minutes. Table II summarizes the methods used in preparing these dispersions.

The exact amount of carbon black present in each dispersion was determined according to ASTM Procedure D-1603-58T. Briefly, the method involves removal of the polyethylene by volatilization at 500°C. in a stream of nitrogen, leaving the carbon black as residue. The percentage is gravimetrically determined.

Preparation of Film Samples

In order to measure light absorptivity accurately, thin uniform films were prepared from each dispersion. Several techniques, as well as several molds, were tried before finding a satisfactory procedure.

TABLE I—POLYETHYLENE-CARBON BLACK DISPERSIONS

Dispersion	Conc., %	Carbon Black—Particle Size, A	Carbon Black—Type
A	0.54	88	Channel
B	2.56	88	Channel
C	2.49	88	Channel
D	(~2.5) not determined	88	Channel
E	(~2.5) not determined	88	Channel
F	2.41	88	Channel
G	0.24	88	Channel
H	0.49	110	Channel
I	2.48	110	Channel
J	0.52	130	Channel
K	2.45	130	Channel
L	0.48	173	Channel
M	2.52	173	Channel
N[a]	2.75	173	Channel
O	0.46	175	Furnace
P	2.54	175	Furnace
Q	0.49	180	Channel
R	2.59	180	Channel
S[a]	2.75	230	Channel
T	0.52	246	Channel
U	2.60	246	Channel
V	0.59	560	Furnace
W	2.68	560	Furnace
X	0.54	1485	Thermal
Y	2.69	1485	Thermal
Z	0.54	2900	Thermal
AA	2.68	2900	Thermal
BB[b]	2.36	——	——
CC[b]	2.38	——	——

(a) 0.5-mil extruded commercial films.
(b) Commercial dispersion.

The best films resulted using a pair of chrome-plate, mirror-polished machinists' flats as molds. Pieces of 2-mil Mylar film were used between the polyethylene and the mold to prevent sticking. The polyethylene was placed between the Mylar films in the mold in a preheated Preco press. At a temperature of from 380° to 400°F., the full 40,000 pounds of force of the press was applied. After two minutes of heat and pressure, the film was cooled under pressure.

A circle one inch in diameter was cut from the center of each film using a template and razor blade. Obviously, non-uniform films and those containing holes or other imperfections were discarded. Average thickness of each film was determined by weighing on an analytical balance and calculating weight per unit area.

For the optical-density measurements, the films were mounted by placing them between glass plates with a thin film of glycerine in contact with each side. No air inclusion or wrinkles were allowed to remain. It was necessary that the film completely cover the aperture and extend over the edges (i.e., a 1 inch film was used in a ⅞ inch aperture for the Photovolt instrument). The films were handled with blunt tweezers at all times to avoid fingerprints and scratches.

Three types of instruments were used in making measurements of the light-transmission properties of the film specimens—a microspectrophotometer, the Photovolt densitometer, and the Cary spectrophotometer.

The microspectrophotometer consisted of a monochromator, a microscope, and a photomultiplier unit which were assembled in the laboratory. The diameter of the specimen area examined was varied either by changing the magnification of the microscope or by changing the image-plane aperture. The angular aperture of the illuminating beam was controlled either by changing objectives or by means of the condenser diaphragm. The wave length of the illuminating beam was selected by means of the monochromator. The microscope was fitted with a mechanical stage and film thickness was measured on the same area (using fine focus of the microscope) as optical density.

In determining optical density with the Photovolt instrument, the per cent of light transmission was measured at six evenly distributed points around the circumference of each film. These percentages were averaged and the average optical density calculated (optical density=log 1/transmission). This procedure was carried out on four or five films ranging up to 0.003 g/cm² in thickness for each dispersion. From a plot of optical density versus film thickness, it was possible to determine optical density for a given thickness.

Factors Influencing Light Transmission

In order to determine qualitatively which variables are effective in the measurement of the light-transmission properties of polyethylene-carbon black film compositions, a number of specimens were prepared from Bakelite DYNH No. 3 polyethylene as the base material, using the standard milling procedure previously described. Each composition contained approximately 0.5 per cent of one of a series of carbon blacks selected to represent a cross section of available particle sizes and types, as follows:

Particle Size, A	Type	Dispersion Code Letter
88	Channel	A
175	Furnace	O
246	Channel	T
560	Furnace	V
1485	Thermal	X
2900	Thermal	Z

Complete data on these compositions were given in Table I.

Films of three different thicknesses were made from these compositions by the standard technique of pressing a few milligrams of the resin between chromium plated blocks. The microspectrophotometer was used to make the optical measurements involved.

Wave Length of Illuminating Beam

The relative effect of the wave length of the illumination used to measure light-transmission properties can be seen from a study of the values of average

TABLE II—PREPARATION OF DISPERSIONS OF DIFFERENT DEGREE

Dispersion	Masterbatch, wt carbon black/wt polyethylene	Final Batch, wt masterbatch/wt polyethylene	Measured Concentration Carbon Black, %	Milling of Final Batch
A	(a)	(a)	0.54	Standard technique
B	(a)	(a)	2.56	Standard technique
C	Conc. uncertain	Entire masterbatch/ remaining polyethylene	2.49	2 or 3 minutes
D	15/45	55/459	(2.75)[b]	3 or 4 passes
E	13.7/250	263/250	(2.75)[b]	One pass
F	60/180	55/459	2.41	1.5 minutes
G	20/20	2/500	0.24	20 minutes

(a) Masterbatch technique not used on these samples.
(b) Calculated value.

absorption coefficient as a function of wave length. Figure 1 shows this relationship for films prepared from two compositions containing carbon blacks of very different particle sizes. It can be seen, in the case of the composition containing the black of small particle size, that the absorption coefficient, and consequently, the absorptivity, increases with decreasing wave length. Conversely, the presence of blacks of large particle size results in a relatively constant value of the absorption coefficient.

Figure 2 shows the effect of the wave length of the illuminating beam on the optical density of films of varying thickness. The greatest range of values over a given span of film thicknesses was obtained with the shortest wave length. This effect was considered to be desirable to obtain the greatest precision in the test.

Film Thickness

Figures 1 and 2 show the large effect of film thickness. As would be expected, absorption coefficient goes up as the thickness increases, and then tends to level off. When dispersion of any carbon black in polyethylene was extremely poor (such as D and E in Table I), it was impossible to draw a straight-line plot of optical density versus film thickness. Instead, a scatter plot was formed, making it impossible to read an optical-density value with any reasonable precision for a given thickness.

The lack of a precise optical density value prevented calculation of a meaningful absorptivity value. Table III contains a tabulation of measured optical densities and calculated absorptivity values in ultraviolet and blue light for the various dispersions prepared in the laboratory.

Dispersions of both large and small particle-size blacks were studied under a variety of conditions using the Photovolt transmission densitometer. Figure 2 illustrates the variation of optical density with film thickness for a given polyethylene-carbon black composition.

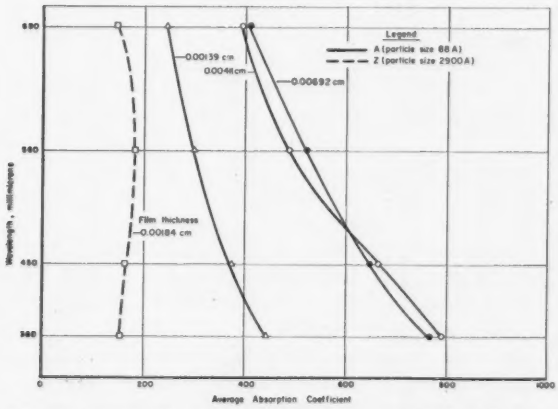

FIG. 1—Average absorption coefficient vs. wave length of illumination for two 0.5 per cent carbon black dispersions.

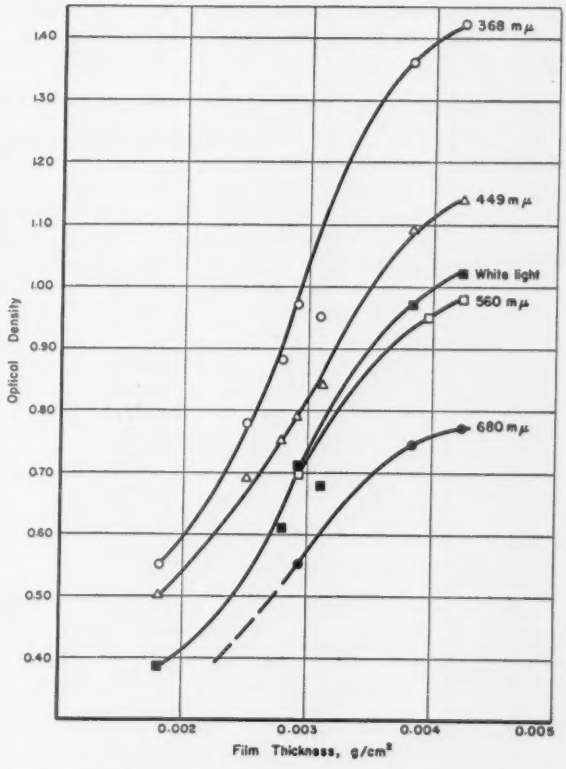

FIG. 2—Optical density vs. film thickness for different wave lengths of light (Dispersion A).

It can be seen that Bouger's law applies only in certain portions of the range of film thicknesses, and that different wave lengths of light give different curves. It is evident that a test method must specify a film thickness, that the thickness specified must be on the straight-line portion of the curve, and that, within this range, the choice must be the maximum thickness consistent with the sensitivity of the instrument.

Transmittance of polyethylene-carbon black compositions was measured in 380-millimicron light with the microspectrophotometer, using a large angular aperture (numerical aperture of lens = 0.95) and a large-beam cross section. The results are shown in Table IV. Dispersion A, containing a small particle-size black, deviated markedly from Bouger's law. The dispersions of large particle-size blacks (X and Z) showed little variation of absorption coefficient with specimen thickness. Figure 3 shows the relationship found between particle size and average absorptivity.

It was found that variations in the angular aperture of the illuminating beam had little or no effect on the measured absorption coefficient for either large or small particle-size carbon blacks.

The size of the cross-sectional area of the illuminating beam also had little effect on the measured absorption coefficient. The measurements were made on specimens prepared from materials in which the carbon black was well dispersed. It is likely that serious variations might be encountered in the case of a poorly dispersed black, in making measurements from point to point. This effect would become pronounced as the area of the illuminating beam was reduced.

On the basis of the results of the microspectrophotometer study, it was concluded that an instrument such as the Photovolt transmission densitometer could be used to determine light-transmission properties of polyethylene - carbon black compositions. Furthermore, use of a short wave length filter and

TABLE III—OPTICAL DENSITY AND ABSORPTIVITY FOR LABORATORY-PREPARED DISPERSIONS

Film Thickness 0.002 g/cm²

Dispersion	368 mμ Optical Density	368 mμ Absorptivity, cm²/g	449 mμ Optical Density	449 mμ Absorptivity, cm²/g
A	0.622	57,600	0.544	50,400
B	3.43	67,000	2.54	49,700
C	2.81	56,300	2.20	44,200
D[a]	—	—	—	—
E[a]	—	—	—	—
F	2.87	59,500	2.16	44,900
G	—	—	0.164	34,200
H	0.585	59,700	0.455	46,400
I	3.18	64,000	2.53	51,000
J	0.606	58,200	0.468	45,000
K	3.03	61,900	2.37	48,400
L	0.591	61,600	0.450	46,900
M	3.22	64,000	2.48	49,200
O	0.521	56,600	0.524	57,000
P	2.98	58,700	2.60	51,200
Q	0.581	59,300	0.450	45,900
R	3.43	66,100	2.58	49,800
T	0.487	46,800	0.487	46,800
U	3.11	50,000	2.56	49,700
V	0.330	28,000	0.397	33,600
W	2.22	41,400	2.08	38,800
X	0.236	21,900	0.333	30,800
Y	1.26	23,400	1.35	25,100
Z	0.037	3,560	0.113	10,500
AA	0.47	8,760	0.57	10,600

(a) Impossible to draw a straight-line plot of optical density versus film thickness.

TABLE IV—MICROSPECTROPHOTOMETER DATA

λ = 380 mμ

Dispersion	Particle Size, A	Thickness, cm	Concentration Carbon Black, %	Transmittance, %	Coefficient of Absorption	Absorptivity, cm²/g
A	88	0.00139	0.54	34.2	771	67,500
A		0.00411	0.54	3.2	836	73,300
A		0.00692	0.54	0.12	975	85,000
O	175	0.00151	0.46	38.4	634	65,200
O		0.00441	0.46	5.9	642	65,900
O		0.00725	0.46	1.3	599	61,600
T	246	0.00166	0.52	37.0	599	54,400
T		0.00347	0.52	11.3	628	57,100
T		0.00550	0.52	1.5	764	69,400
V	560	0.00347	0.59	19.0	478	38,300
V		0.00655	0.59	4.0	492	39,300
V		0.00831	0.59	2.7	433	34,800
X	1485	0.00094	0.54	80.0	237	20,700
X		0.00184	0.54	50.6	371	32,500
X		0.00254	0.54	49.4	278	24,200
X		0.00628	0.54	11.0	351	30,700
Z	2900	0.00094	0.54	87.5	142	12,200
Z		0.00136	0.54	83.5	133	11,800
Z		0.00529	0.54	51.6	125	10,900
Z		0.00966	0.54	27.2	135	11,800

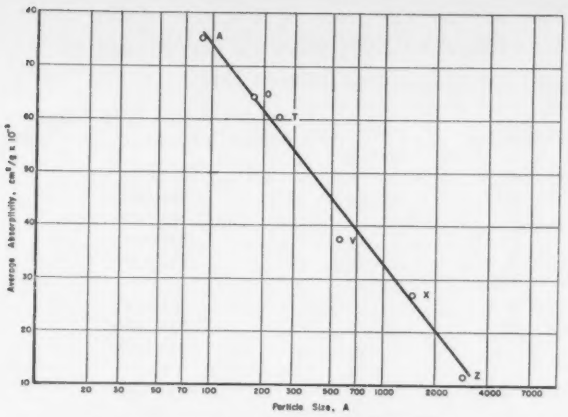

FIG. 3—Particle size vs. average absorptivity.

large area of examination was desirable. Examination of the optical density of a series of films prepared from compositions containing carbon blacks of various particle sizes showed that, for a given film thickness, the dispersion containing the smallest particle size had the highest optical density. This effect is shown in Figure 4.

Establishment of Test Conditions

After it had been demonstrated that the wave length of the illuminating beam, the film thickness, and the size of carbon black particles were the primary variables affecting the measurement of light transmission through these films, it was necessary to establish the optimum conditions of measurement in terms of these variables. In addition, it was soon realized that the optical system and its calibration were important factors in this procedure, and that a critical evaluation of these components was necessary. A final consideration also had to be given to the matter of specimen film preparation and thickness measurement. Each of these factors and the quantitative evaluation of its effect had to be considered individually.

Comparison of Instruments

The Cary spectrophotometer was used to measure optical densities of nominal 0.5 per cent dispersions of carbon black in polyethylene for comparison with similar data taken with the Photovolt instrument. Table V shows the results. Obviously, the Cary values were considerably higher than the corresponding Photovolt values in all cases but one.

The wide difference between absorptivity values determined using the Photovolt transmission densitometer, and the Cary spectrophotometer made apparent the fact that values from the two instruments should not be compared. This had not been previously realized. Widely different optical-density readings were obtained for the Kodak calibrated photographic steps, even though both instruments were calibrated using the same didymium filter. The Photovolt readings agreed very closely with the Kodak values, while the Cary readings were much higher.

TABLE V—ABSORPTIVITY AS MEASURED ON CARY SPECTROPHOTOMETER VERSUS PHOTOVOLT TRANSMISSION DENSITOMETER

$\lambda = 368$ mμ

Dispersion	Absorptivity, cm²/g — Photovolt Transmission Densitometer	Absorptivity, cm²/g — Cary Spectrophotometer
A	57,600	57,500
O	56,600	71,800
T	46,800	53,700
V	28,000	42,700
X	21,900	28,700
Z	3,560	12,300

The seeming discrepancies can be traced to inherent differences in the instruments. The Cary is a prism instrument and measures specular density, while the Photovolt is a filter-type instrument and is designed to measure diffuse density. In addition, it was learned that measuring light transmission of 2.75 per cent carbon black dispersions pushes the Cary to a range where much of its accuracy is lost.

Filters over a wide range of wave lengths are available for use with the Photovolt transmission densitometer. The greater spread in optical densities obtained at lower wave lengths for a given set of dispersions (see Figure 5) pointed up the advisability of specifying a short wave length. However, the photographic step tablet was found to transmit so little light in the ultraviolet region that the accuracy of calibration there was questionable.

Wave Length

Further, in the ultraviolet the optical densities of the carbon black-polyethylene compositions were so great that it was difficult to pass enough light through even very thin films to make a reading. Therefore, the next lowest wave length studied is suggested for use, i.e., 449 millimicrons.

It was extremely difficult to mold consistently usable

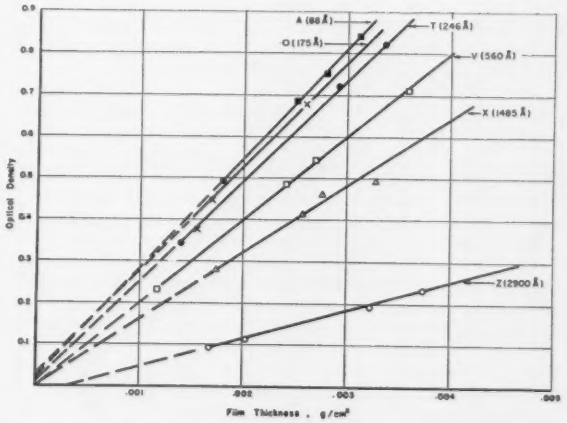

FIG. 4—Film thickness vs. optical density in 449 mμ light for dispersions containing blacks of a wide range of particle sizes.

films of a specific desired thickness. Use of 449-mμ illumination with the Photovolt instrument limits the usable film thickness to about 0.003 g/cm². If optical densities of films having a range of thicknesses up to about 0.003 g/cm² are determined, then it is possible to read the value for a desired thickness from a plot of optical density versus thickness. Specifying the thickness is necessary because the absorptivity varies slightly with film thickness. Use of this plot also eliminates the effects of one bad film on the calculation.

Examination of the data (for example, see Figure 4) indicates, as would be expected, that a greater absorptivity range is found if values are calculated for relatively thick films. These values are more reproducible than those for extremely thin films. Although there has been a tendency to use a thickness of 7×10^{-4} g/cm² *(6)*, it would appear that specification of 2×10^{-3} g/cm² for calculations would be more reliable.

Absorptivity calculations at present seem to give the best measure of the differences between dispersions. The use of Ambrose slopes was investigated, but it appeared that particle size affected these slopes more than the degree of dispersion. Furthermore, use of Ambrose slopes would require examination of the films in several wave lengths of light, while absorptivity can be calculated for one wave length.

Accelerated Aging Data

Accelerated aging was carried out in an Atlas Weather-Ometer with a cycle of 102 minutes of light followed by 18 minutes of light and water at 140° F. Brittleness temperature was followed as a means of detecting deterioration.

The brittleness specimens were flash molded at 240° F. as 6 by 6 by 0.075 inch squares and cooled under pressure. Plaques were cut to fit the Weather-Ometer sample holders. After the prescribed period in the Weather-Ometer, brittleness specimens were die cut from the plaques. Brittleness temperature was determined following ASTM D-746-55T. Testing was discontinued when 50 per cent failure occurred at —40° C. The number of hours of accelerated aging necessary to raise the brittleness temperature to —40° C. was used as a measure of weatherability.

Brittleness temperature data as a function of aging were collected on all laboratory dispersion except for the 2.5 per cent small particle-size blacks which failed before aging. Figure 6 shows the rise in brittle-

TABLE VI—SUMMARY OF ACCELERATED-WEATHERING DATA

Dispersion	Weather-Ometer Time Before 50% Failure Occurred at —40°C., hr.
A	2000+
B	1700-1800
C	1700-1800
D	800-900
E	700-800
F	1700+
G	300-400
H	1500-1600
J	1500-1600
L	1600+
O	200-300
P	0
Q	1600
T	200
U	1000
V	0
W	0
X	300-400
Y	1400-1500
Z	200-300
AA	800-900
None (unpigmented DYNH polyethylene)	300-400

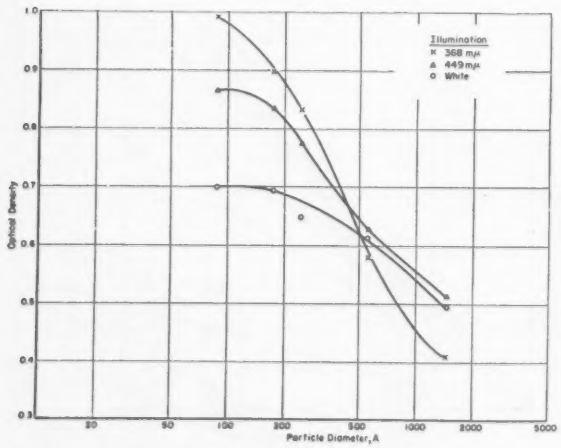

FIG. 5—Optical density of 0.5 per cent dispersions vs. particle size in three types of illumination for films 0.0032 g/cm² in thickness.

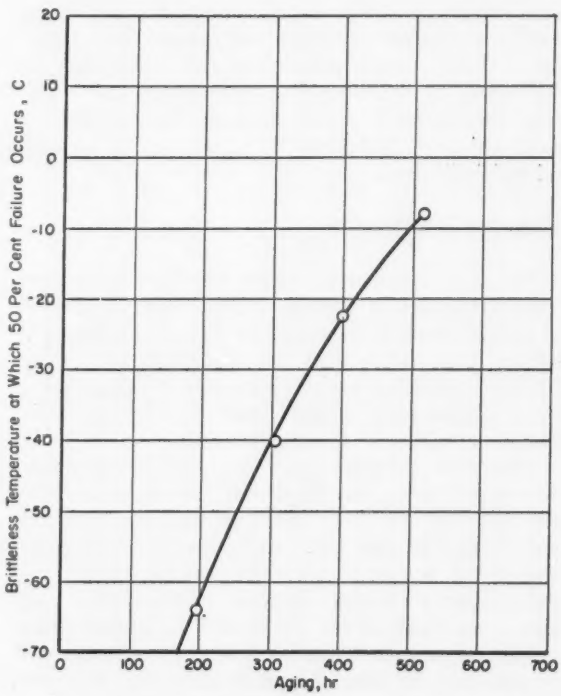

FIG. 6—Brittleness temperature vs. accelerated aging for clear DYNH polyethylene.

TABLE VII—COMPARISON OF ABSORPTIVITY WITH ACCELERATED WEATHERING DATA

Dispersion	Photovolt Absorptivity in 449-mμ Light, cm^2/g	Weather-Ometer Time Before 50% Failure Occurred at —40° C., hr.	Type Carbon Black	Particle Size, A
A	50,400	2000+	Channel	88
B	49,700	1700-1800	Channel	88
C	44,200	1700-1800	Channel	88
D	——[a]	800-900	Channel	88
E	——[a]	700-800	Channel	88
F	44,900	1700+	Channel	88
G	34,200	300-400	Channel	88
H	46,400	1500-1600	Channel	110
J	45,000	1500-1600	Channel	130
L	46,900	1600+	Channel	173
O	57,000	200-300	Furnace	175
P	51,200	0	Furnace	175
Q	45,900	160	Channel	180
T[b]	46,800	200	Channel	246
U[b]	49,700	1000	Channel	246
V	33,600	0	Furnace	560
W	38,800	0	Furnace	560
X	30,800	300-400	Thermal	1485
Y	25,100	1400-1500	Thermal	1485
Z	10,500	200-300	Thermal	2900
AA	10,600	800-900	Thermal	2900

(a) Impossible to draw a straight-line plot of optical density versus film thickness.
(b) Particle size greater than 20 millimicrons.

ness temperature of unpigmented DYNH with time.

Table VI gives a summary of the accelerated weathering time necessary to raise the brittleness temperatures of the dispersions to —40° C. In three cases, the specimens did not fail during the period they were under study. Surprisingly, the specimen that lasted longest contained 0.5 per cent rather than 2.6 per cent of the smallest particle-size black. The presence of channel blacks resulted in the best weatherability, while furnace blacks resulted in brittleness temperatures above —40° C. before aging, in most instances.

Correlation of Data

Table VII shows a direct comparison of Photovolt absorptivity data with accelerated-weathering data. In all dispersions of channel blacks less than 20 millimicrons in diameter which lasted 1500 hours or more in the Weather-Ometer, the absorptivity in 449-mμ light was 44,000 cm^2/g or greater.

The one channel black larger than 20 millimicrons (dispersions T and U) met this absorptivity value, although the dispersions failed in the Weather-Ometer in a shorter time. Both dispersions (O and P) of one furnace-type black had extremely high absorptivities, but the brittleness temperature before aging was higher than —55° C. in both cases and above —40° C. for the higher concentration.

The poor dispersions of the smallest particle-size black (D, E, and G) lasted less than 1000 hours in the Weather-Ometer. Their absorptivities either were not measurable (D and E) or fell below 40,000 cm^2/g (G).

It is recognized that there are probably some differences between accelerated weathering data and outdoor weathering data. A definitive study in this area is urgently needed. However, until such a study is made, it will be necessary to accept accelerated weathering data as representative of outdoor aging. This assumption was made in this work in the development of a test procedure for determining the weatherability of polyethylene-carbon black compositions.

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SPECIAL INDUSTRY REPORT

Conventions—Travel and Tax Deductions

By LARSTON D. FARRAR
Washington 4, D. C.

► It seems hard to believe, but there still are many rubber company executives, as well as businessmen in all fields, who do not understand clearly their rights about claiming expense deductions under the U. S. Internal Revenue Code.

While not even the tax experts in the Internal Revenue Service headquarters in Washington claim to know the answer to every last tax problem, I went to the IRS to seek some guidelines which might be useful to businessmen who want to be crystal clear about what they can and cannot deduct as legitimate business expenses in connection with attending a convention either across the street or across the nation.

I might point out—to buttress this thought about twilight zones on economic-taxation problems—that there now are more than 13,000 cases (with some $1.3 billion in dispute) pending before the Tax Court of the United States. These are cases in which the taxpayer, by coughing up $10, has appealed the rulings of the Commissioner of Internal Revenue to this special court which was set up to rule on specific differences which inevitably arise in the administration of a law as complex as the Internal Revenue Code. This code—like most other masterpieces—is one book about which critics —mostly taxpayers—disagree violently.

Be all this as it may, what are some of the guidelines **you** might keep in mind about tax deductions in connection with going to a convention and your activities while there?

Guidelines

First, conventions are recognized by the IRS as occasions on which businessmen might (1) obtain new business operation knowledge; (2) mingle with both suppliers and prospects in the business field to which the convention relates, and (3) make new business connections, either among suppliers or potential customers.

The primary purpose of a convention, therefore, is business. There may be some pleasures connected with a convention—outings, parties, and so forth—but these are recognized by IRS as being incidental social occasions subordinate to the prime purpose of the convention.

Purposes

Second, IRS is not so interested in how much you deduct for the trip, or for the other activities you undertake while there, as it is in the purpose of the various deductions you claim and the accuracy of your records.

For example, the IRS does not care whether you go by car, train, or airplane. In any case, the actual travel costs to and from are entirely deductible. The IRS also is not interested in what kind of accommodations you have—i.e., whether they are expensive or inexpensive. Whether you stay in a $100 a day hotel room, or in a private home for $1 a day, while you are attending a convention, the entire cost is deductible. Likewise, the IRS is not interested—officially—in whether you eat expensive food, or at Joe's Hash House. All of these expenses naturally are deductible, as long as they actually are incurred.

All of your expenses, in connection with going to the convention, living in the city where it is being held, and returning from the convention, are deductible. So are the expenses in connection with the convention—any registration fees, admission charges to special meetings, and so forth.

Why, then, do differences arise over convention expenses between a businessman and the IRS agent who may examine the businessman's tax return?

Differences

First, a lot of these differences arise because the businessman has not kept adequate records of his expenditures, and proof of them.

It is best, when you go on a convention trip, to keep a small pocket notebook with you and to jot down all expenses, as these occur, so that you will have an original record on which to base your deductions and with which to prove you incurred the expenses claimed. It also is best to retain ticket stubs (on travel), the hotel bill (marked "paid," if you pay the bill in cash), and receipts for whatever you normally would want to have receipted. It is not necessary, for example, to get a receipt from every cab driver (as some businessmen do), and from every waiter who serves your table. But

Documentation of expenses can simplify some of the chaos when the Internal Revenue Service looks over your return

you should jot down these expenses. As long as the amounts are in line, it is not likely that any IRS agent would challenge them or demand that you show specific receipts. And, of course, you will pay some of the expenses, in connection with your various movements, by check. Naturally, a cancelled check is a receipt for an expenditure.

A classic case in this field was that of a traveling salesman who was able to deduct $7,050 of travel costs against a gross income of only $9,000 because he meticulously kept a current expense diary. This was a "little black notebook" that paid off.

Documentation

The Treasury regulations officially accept a daily diary, or notebook record, showing the amount and nature of business travel expenses, including convention expenses, as good proof that these amounts were spent. But the regulations also require supporting documents to back up the diary, especially for larger or exceptional amounts, so keep all receipts, ticket stubs and other supporting evidence.

However, one traveling salesman, who did not save any supporting evidence but did keep a travel diary of his expenses, took his case to the Tax Court when the deductions claimed were disallowed. The Tax Court ruled in his favor, despite the lack of supporting documents, because the diary itself was well kept and obviously was not a forgery.

Second, some of the differences between a businessman and an IRS agent arise over the purpose of the specific expenditures.

Let's say you entertain a group—how many persons doesn't matter—at a dinner, or on a special side trip, or in other legitimate ways, during the convention. If the **purpose** of the entertainment can be shown—to the satisfaction of the agent—to have been to promote your business, sales, or to turn a profit (in the long run or in the short run), then it is clearly a deductible business expense. If, on the other hand, the purpose was merely for the enjoyment of yourself and friends, then if the investigation shows this, the expenses will be disallowed.

Third, differences arise as to the expenses of others on the trip with the businessman whose expenses he may bear and try to deduct. Many businessmen have been successful in deducting the expenses of their wives, because they could show that the wives were officials of their companies and actually went to the convention for the same purposes as their husbands.

Whomsoever

The same problems naturally arise when other members of a businessman's staff attend a convention . . . his secretary, his vice president, his general manager, or whomever. In each case, if he claims the expense of taking these people to the convention, he should be prepared to show, on a reasonable basis, that they went along for business purposes and that their presence was necessary in the improvement of his business in some way. Naturally, if the purpose for which these people are being taken to the convention is acceptable as a business purpose, then their expenses are deductible just the same as those of the businessman himself, granted the records are in good order.

If you, therefore, intend to take anyone with you to a convention, and to claim his or her expenses, be certain in your own mind, and let it be certain in his or her mind, that the purpose for which you and they are going is strictly business. If the agent questions you and you say that the others went for business reasons, and they casually remark to him, on another occasion, that they went for fun, he has a basis on which to challenge the deduction of their share of the expenses. In other words, be clear in your mind that you need these others at the convention, or that they need the additional information, contacts, or whatever, they will receive at the convention to help you push forward your business. If this is clear in the minds of all, it can be made clear to the IRS agent.

Disagreements

What happens in case you and the IRS agent disagree about the expenses you have incurred and deducted? Can he arbitrarily "disallow" them, in spite of what you tell him? No. There is a procedure by which you can obtain an independent hearing, inside the Internal Revenue Service. You can request an informal conference, before a Conference Coordinator, at which you can present evidence—from any source concerned, even officials of the association sponsoring the convention—of the correctness and validity of your claim.

In case you are not pleased with the results of the Conference Coordinator's decision, you can get a formal hearing before the Appelate Division of the Internal Revenue Service. Ninety-five per cent of all differences between taxpayers and agents are settled inside the IRS, and without need for further appeals, by one or the other of these methods of appeal.

Further Appeals

If, after a formal IRS hearing, you still feel that the decision is wrong, you can take one of two roads to further appeals. You can pay $10 and appeal to the Tax Court of the United States. In this event, you do not have to pay the taxes which the IRS says are due, but the payment is held in abeyance until the Tax Court rules. If the Tax Court rules against you and you still want to pursue the case, you can go directly to the U. S. Court of Appeals. If this Court turns you down, you then can appeal to the Supreme Court of the United States.

Or, after you have had your hearing before the IRS Appellate Division, and the ruling is against you, there is another way you can get to the Supreme Court. You can pay the tax which IRS says is due. Then you can make a formal application for a tax refund, for the amount you believe you have overpaid. When and if this is turned down, as it probably will be, you can go into U. S. District Court, or to the U. S. Court of Claims, making a demand for the return of the tax refund which you feel is due you. If the U. S. District Court rules against you, you can appeal to the U. S. Court of Appeals, and so on to the Supreme Court. If you choose to go to the U. S. Court of Claims, and it turns you down, you can appeal directly from that court to the U. S. Supreme Court.

Incidentally, these various routes all have been taken—and by businessmen, too, who felt that an initial decision of a tax agent was antipathetic to them and contrary to the meaning of the Internal Revenue Code. But these cases almost invariably have involved relatively large sums of money.

Compromising

Few people—very few, in fact, in relation to the vast number of taxpayers—ever expend all the time and effort invariably accompanying such appeals unless there is a substantial sum of money at stake. The wisest course, in case there are legitimate disputes, is to "compromise" with the agent, to pay the extra amount, and to forget it—depending upon the amount involved.

There are some people who will stand by principle, through thick and thin, regardless of the size of the financial stakes. As a matter of fact, those who preceded you—and won the rulings from the Tax Court in other years—are the ones responsible for the rights which most businessmen enjoy these days, in the tax field.

Generally speaking, you will find agents of the IRS to be quite reasonable about accepting your records and statements about expenses incurred in connection with conventions. And even when there are disagreements, remember that 95 per cent of these are settled through appeals in the Internal Revenue Service itself.

All in all, if you keep the purpose of the convention in mind, and how you spend your money while at a convention, and keep your records in good order, you have little to fear from the Internal Revenue Service. The IRS respects business, but rejects deductions for monkey business.

EDITORIAL

Gratification and Commendation

► Following publication of our editorial on the ACS Division of Rubber Chemistry in the June, 1961 issue of this journal we received many communications either endorsing our position or calling us to task for our comments. It will be remembered that we addressed ourselves to what we considered to be matters that should be corrected at future Rubber Division meetings. Among these were the general decorum of meetings, abuses of hospitality suites, and attendance at technical sessions. It is interesting to note that while almost all of the communications we received, verbal or written, were in favor of our position even those which chastized us did not find fault with our conclusions—but only with the fact that we had chosen to discuss the matter in print.

Be that as it may. We are extremely gratified to be able to report a vast improvement at the Rubber Division meeting recently concluded in Chicago. Most hospitality suites were closed during technical sessions. Many suppliers even went so far as to point out that *their* hospitality suites would be observing general rules of good conduct. Attendance at technical sessions was good. We, of course, do not claim credit for this since the caliber of the papers was good. Audiences, however, were attentive and responsive.

In all, there was—in our opinion—a new "flavor" at the meeting, more professional in tone, more dedicated to the job at hand. To this end, we commend the officers, directors and all those charged with the responsibility of running the Chicago meeting for a job well done. We believe that a start has been made in the right direction.

One other thing should be said. We have been given to understand that some managements, among both rubber manufacturers and suppliers, were somewhat reluctant to send representatives to the Chicago meeting and that our editorial may have been a factor in this area. To the very few companies involved in this situation we can only suggest that they reacted—but not in the manner intended. It was, and still is, our intention to convey the thought that meetings of the Rubber Division are professional meetings, that the business on hand must take precedence over social affairs, and—above all—that in these serious times it behooves all of us to learn rather than to loll.

We are gratified that our editorial may have accomplished some good—and we commend again all in attendance at the Chicago meeting for their awareness of the situation, particularly the suppliers for their splendid spirit of cooperation. We sincerely hope that the good conduct curve continues upward at the forthcoming Boston and subsequent meetings.

A.C.S. Rubber Division Holds 80th Meeting; New Officers Elected for 1961-62 Season

► The 80th meeting of the Division of Rubber Chemistry of the American Chemical Society, held in Chicago, Ill., from September 6 to 8, in conjunction with the 140th national meeting of the parent society, turned out to be one of the best meetings held by the division in recent years. Official registration for the division at the Sherman Hotel, the headquarters hotel, amounted to 780. Total divisional registration was estimated at 1200, since many members and guests registered at other hotels. The estimated divisional registration represented some 12 per cent of the approximately 9800 society registrations at Chicago.

New officers of the Rubber Division are (left-to-right): *Treasurer*, D. F. Behney (Harwick Standard); *Vice-Chairman*, G. H. Swart (General Tire); *Chairman*, G. E. Popp (Phillips Chemical); and *Secretary*, L. H. Howland (Naugatuck Chemical).

Joint Symposium Held

A highlite of the meeting of the Rubber Division was a full-day joint symposium on "Synthetic Elastomers from Petroleum Hydrocarbons" held with the Division of Petroleum Chemistry on September 6 at the Palmer House. The balance of activities took place at the Sherman and included three sessions of technical papers, the Best Paper Award, and the usual business meeting. There was no banquet or cocktail party, but the 25-Year Club held its regular luncheon-meeting. The new divisional officers for 1961-62, selected by letter ballot, were announced at the business meeting.

The new officers are: *Chairman*, George E. Popp (Phillips Chemical); *Vice-Chairman*, G. H. Swart (General Tire); *Secretary*, Louis H. Howland (Naugatuck Chemical); *Treasurer*, D. F. Behney (Harwick Standard Chemical). A. W. Sloan (Atlantic Research) is the new director-at-large. George Vacca (Bell Telephone Laboratories) remains as assistant secretary and George Hackim (General Tire) as assistant treasurer.

New directors and alternates, elected to represent various local rubber groups, include: *Chicago*, A. L. Robinson (Harwick Standard) and A. G. Cobbe (Cabot); *Connecticut*, H. Gordon (Bond Rubber); *Fort Wayne*, B. Y. Connell (General Tire) and R. L. Blair (Atlantic India Rubber Works); *Southern* J. M. Bolt (Naugatuck Chemical) and A. D. Craig; *Washington*, L. A. Wood (Bureau of Standards) and J. R. Britt (Goodrich).

The symposium, arranged by W. J. Sparks (Esso Research), former chairman of the Rubber Division, featured 13 talks in all, including special talks by the chairmen of the morning and afternoon sessions. These were Harold Gershinowitz, of the Shell Development Co., and George Vila, president of the U. S. Rubber Co., respectively. Dr. Sparks served as general chairman.

Discusses Raw Materials

In opening the morning session of the symposium, Dr. Gershinowitz spoke of "New Developments in Raw Materials for Synthetic Rubber." He noted that within the past two decades the entire pattern of elastomer consumption in the United States has shifted from exclusively natural to predominantly synthetic rubber. By the end of 1961, he stated, U. S. production capacity for polyisoprene and polybutadiene rubbers will total 380 million pounds a year.

Mr. Gershinowitz, whose paper was co-authored by David B. Todd

W. J. Sparks (Esso Research) served as general chairman of the joint symposium held by the Rubber and Petroleum Divisions.

(Shell Development), reviewed recent developments in the field of raw materials for synthetic rubber, not only for the clearly established elastomers, but for the newly emerging elastomers. As these new elastomers are brought to fruition, the petroleum industry can be expected to continue to supply the bulk of the requisite monomers. In time to come, even more sophisticated raw materials will be necessary, he observed.

Vila Addresses Group

At the afternoon session, Mr. Vila discussed "Revolution in Elastomers" in which he emphasized that a breakthrough in rubber science now permits the industry to make any kind of synthetic rubber that is needed. The speaker stated that we have entered a revolution in rubber and rubberlike materials. "We have shaken ourselves free from the molecular designs of mother nature and the previously uncontrollable course of synthetic molecular structure. We can now build molecules exactly to the specifications we wish."

The problem of the future, Mr. Vila concluded, will be to develop not a single ideal rubber, but numerous ideal rubbers, one for each end use.

As indicated by the title of the symposium, the regular and invited papers ran the gamut of petroleum hydrocarbons. One of the papers, presented by J. S. Lasky (U. S. Rubber) dealt with the development of synthetic balata. W. F. Brucksch, Jr. (U. S. Rubber) discussed the processing of a vinyl pyridine rubber, while R. J. Kelly (U. S. Rubber), in discussing ethylene-propylene rubber, stated that this is a highly versatile elastomer in that it can be made extremely resistant to ozone cracking and weathering and has a generally well-balanced set of physical properties.

Morris Gippin (Firestone) discussed the polymerization of butadiene with alkylaluminum and cobalt chloride to produce a new synthetic rubber having a remarkable molecular structure such as is normally found in natural rubber. The catalyst is stereospecific and causes the molecules to arrange themselves in a regular repeating pattern imparting many desirable properties to the resulting polymers.

For his part in the symposium, G. J. Ziarnik (Esso Research) spoke of processing improvements in chlorobutyl rubber. The speaker noted that the chlorination of butyl rubber has produced a new elastomer with faster cure rate and greater crosslink stability.

The anionic polymerization of dienes was covered by Maurice Morton (Akron University), while new vulcanizing systems for ethylene-propylene elastomers were discussed by John Rehner, Jr. (Esso Research). G. Crespi, of the Instituto di Chimica Industriale del Politechnico of Milan, Italy, spoke on the vulcanization of chlorinated ethylene-propylene copolymers.

A. E. Robinson (Hercules Powder) offered a discussion on the chemical aspects of ethylene-propylene rubber vulcanization with aralkyl peroxide and co-agents and presented some conclusions and interpretations based on exploratory work on the EPR vulcanization process.

E. K. Gladding (DuPont) described a new hydrocarbon elastomer which is sulfur curable and which is derived from olefins and diolefins. J. J. Verbanc (DuPont) described another new hydrocarbon elastomer, this one synthesized from petroleum intermediates using coordination catalysis.

Mark Gives Summation

Professor Herman F. Mark, director of the Polymer Research Institute at the Brooklyn Polytechnic Institute, climaxed the symposium by offering a perceptive summary of what had been presented by the various authors.

It is interesting to note that six major rubber and chemical companies and technological institutes in the United States and Italy were represented at the symposium. The symposium itself was very well attended

Dr. G. F. Bloomfield of the Natural Rubber Producers Research Association of England presented one of the interesting technical papers at the symposium.

with over 350 in the audience during the presentation of some of the papers. As a sidelight it is also interesting to note that a show of hands requested by Mr. Vila at the afternoon session indicated that the audience was predominantly composed of members of the Division of Rubber Chemistry.

(EDITOR'S NOTE: A booklet reproducing all of the papers presented at the symposium on "Synthetic Elastomers from Petroleum Hydrocarbons" was prepared by the Division of Petroleum Chemistry. Copies of this booklet may be secured at $2.00 each from the Treasurer of the Rubber Division, D. F. Behney, Harwick Standard Chemical Co., 60 South Seiberling St., Akron 5, Ohio.)

Regular Technical Session

Several excellent papers were included at the regular technical sessions of the division which followed at the Sherman Hotel on September 7 and 8. Abstracts of all these papers, including the papers given at the joint symposium, were published in the August, 1961, issue of this journal.

Due to the absence of Wesley Coe (Naugatuck Chemical), the retiring chairman of the division, now located in Argentina as director of the petroleum complex being constructed in that country by U. S. Rubber and others, the reins of the meeting were in the hands of George Popp (Phillips Chemical), vice-chairman. Mr. Popp chaired the technical session on Thursday morning, September 7, and H. J. Osterhof (Goodyear), director-at-large, the afternoon session. The final technical session, on Friday morning, September 8, was

presided over by T. C. Argue (Roth Rubber), one of the co-chairmen of the Local Arrangements Committee.

The quality of some of the papers at the three technical sessions attracted audiences as large as 500 members and guests, by all accounts one of the best attendance records established at any division meeting.

Business Meeting

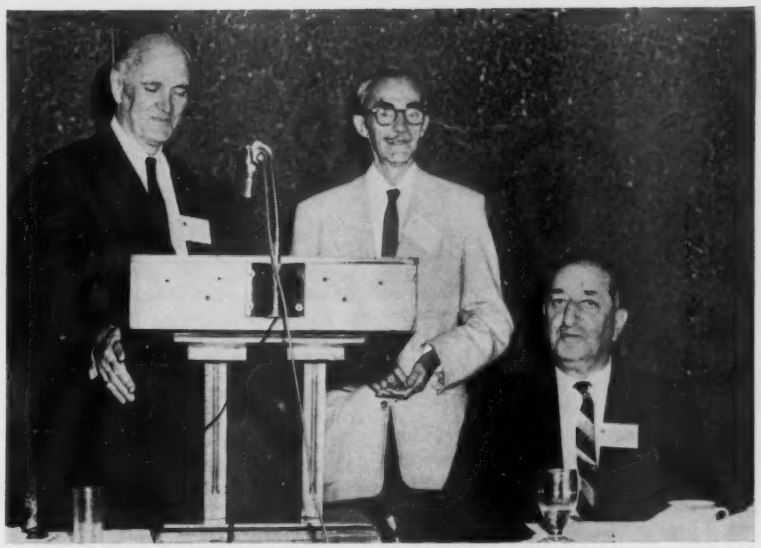
Vice-Chairman Popp presided over the business meeting held on September 7, where the first order of business was a moment of silence in memory of those Rubber Division members who had died since the last meeting. Deceased members so honored included James S. Boyle, George J. Klein, John P. Coe, George W. Steahly and Rudolph P. Knapp.

Mr. Popp acknowledged the excellent work done by the Local Arrangements Committee in preparing for the meeting, particularly the general chairman, Mr. Argue, and the general vice-chairman, James Sheridan (N. J. Zinc). He announced that the 1962 Spring Meeting of the Rubber Division, to be held in Boston, Mass., would be handled by a Local Arrangements Committee headed by John Hussey (Goodyear Chemical) and Thomas Edwards (Acushnet Process).

Members then had an opportunity to vote on some changes to the by-laws of the organization. A penalty clause pertaining to delinquent members who wish to be reinstated was eliminated. As a commercial auditor is now engaged to audit the books, it was decided to abolish the Auditing Committee. It was also voted that the business manager of *Rubber Chemistry & Technology* rather than the editor of that publication prepare the budget for that journal henceforth. In another action the assistant secretary of the division was named a member of the Executive Committee.

Goodyear Medalist Named

Mr. Popp paid special tribute to Dr. Sparks for his work as general chairman of the committee which arranged for the joint symposium with the Petroleum Division. Dr. Sparks then announced that Dr. Melvin Mooney, senior physicist for the U. S. Rubber Co., had been selected to receive the Charles Goodyear Medal for 1962. The Goodyear Medal will be presented to Dr. Mooney at the forthcoming Spring Meeting in Boston. (A complete story on Dr. Mooney appears elsewhere in this issue.)



Dr. G. S. Whitby (center) of the University of Akron was chosen as the member in attendance at the 25-Year Club luncheon with most years' service in the rubber industry. H. A. Winkelmann (left) of Dryden Rubber and Ben W. Lewis (right) of Witco Chemical, flank Dr. Whitby.

Also announced at the meeting was the naming of new emeritus members of the division. The total list now includes G. H. Brittain, Seward Byam, C. E. Frick, R. D. Gartrell, W. E. Glancy, F .L. Holbrook, C. D. Kennedy, Fredick Marchionna, J. J. Rankin, C. H. Schultz and A. O. Zimmerman.

Mr. Popp then presented a certificate to W. S. Coe, retiring chairman, honoring him for his work with the organization. Dr. Howland accepted the certificate for Mr. Coe.

Best Paper Award

In another action at the business meeting, the Best Paper Award was presented to William M. Hess (Columbian Carbon) for his paper on "The Analysis of Pigment Dispersion in Rubber by Means of Light Microscopy, Microradiography and Electron Microscopy" which he presented at the 1961 Spring Meeting in Louisville, Ky.

As of August 15, 1961, Rubber Division membership stood at 2,315 regular members and 393 associate members. This is 153 and 22 more, respectively, than were enrolled at the time of the 1961 Spring Meeting.

The Executive Committee of the Rubber Division is giving thought to holding a meeting aboard a ship as a substitute for one of the presently scheduled meetings. As soon as some decision has been reached, the membership will be advised. (A complete schedule of presently planned meetings appears elsewhere in this issue.)

25-Year Club Meeting

The luncheon-meeting of the 25-Year Club, with Ben Lewis (Witco Chemical) presiding, was held at the Sherman Hotel on September 7. A minute of silence was first observed for George Klein and John P. Coe, who had passed away since the last meeting of the club. New members, attending their first luncheon-meeting, were introduced. These included John Cramer, Ed Geise, B. A. Kaufman, John Taylor, John McWhorter, W. Platt, John McKay, Herbert Schwartz and Robert Van Patten Steiger.

Following the usual practice, Dr. H. A. Winkelmann (Dryden Rubber) went through the procedure of selecting the member in attendance with the longest service in the rubber industry, not previously so recognized by the club. The honors at Chicago went to G. Stafford Whitby, professor emeritus of the University of Akron. Dr. Whitby, who received the money clip memento, has been associated with the industry for 51 years.

It was announced that Owen Brown (Cabot) would preside over the next meeting of the club which will be held during the 1962 spring meeting at Boston.

T. C. Argue (Roth Rubber) and James Sheridan (N. J. Zinc) served as general chairman and general vice-chairman, respectively, of the Local Arrangements Committee at the Chicago meeting.

Local Committee

Considering the complexity of the meeting, the Local Arrangements Committee did a particularly fine job, including the aforementioned Mr. Argue and Mr. Sheridan, who served as general chairman and general vice-chairman, respectively, and the following committee chairmen: *Finance,* Harold Stark (Dryden Rubber); *Printing,* Bateman Hutchison (Copolymer); *Program and Rooms,* Bert Vandermar (Acadia Synthetic); *Housing,* Al Marr (Judsen Rubber); *Registration,* Harold Shetler (Chicago Rawhide); *Ladies' Entertainment,* Robert Varick (Fred A. Jensen); *Plant Trips and Transportation,* Edward Wagner (Witco); *Publicity,* Wiley Carr (American Synthetic Rubber); *Information,* Roger Pfau (Texas-U.S. Chemical). Special note should also be taken of the many dedicated persons who served on each of the above-mentioned committees.

Divests 3M of Wire Firm

► Acting in accordance with a consent decree settlement with the Federal Trade Commission, Minnesota Mining & Manufacturing Co., St. Paul, Minn., has sold back Insulation & Wires, Inc. to the Essex Wire Corp., Fort Wayne, Ind. Insulation & Wires, Inc. was purchased by Minnesota Mining from Essex Wire in 1956, the same year in which the St. Paul firm acquired Prehler Electrical Insulation Co. of Chicago, Ill. In June, 1960, the FTC filed a complaint against 3M, charging that the acquisition of Insulation & Wires and Prehler violated the antitrust act, and asking that 3M be ordered to divest itself of both companies.

Under the recently announced consent decree, Minnesota Mining agreed to divest itself of Insulation & Wires, and the FTC agreed to dismiss its charges that the Prehler acquisition violated the anti-merger act. The consent order also prohibits Minnesota Mining from acquiring an interest in any electrical insulation distributor for the next decade. In addition, the FTC has ordered 3M to make sure that, for a period of five years, no less than 22 per cent of the purchases of Prehler, an electrical distributing firm, be made from outside suppliers. Prehler will continue operations as a 3M subsidiary. The consent agreement is designed to settle the commission's antitrust complaint without constituting an admission by Minnesota Mining that it had violated the law.

Future Meetings of the

Division of Rubber Chemistry

American Chemical Society

Date	Place	Hotel
1962		
Apr. 24-27	Boston, Mass.	Statler
Oct. 16-19	Cleveland, Ohio	Sheraton
1963		
May 7-10	Toronto, Canada	Royal York
Sept. 10-13	New York, N. Y.	Roosevelt
1964		
Apr. 28-May 1	Detroit, Mich.	Cadillac
Sept. 1-4	Chicago, Ill.	Sherman
1965		
May 4-7	Miami Beach, Fla.	Fontainebleau
Oct. 19-22	Philadelphia, Pa.	Bellevue-Stratford
1966		
May 3-6	San Francisco, Cal.	Fairmount
Sept. 13-16	New York, N. Y.	*
1967		
May 2-5	Montreal, Canada	Queen Elizabeth
Sept. 12-15	Chicago, Ill.	Sherman

*Tentatively scheduled at the Roosevelt Hotel, pending final decision

DuPont Fills Sales Posts

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced eleven new sales appointments in the Elastomer Chemicals Department, including an assistant to the director of sales, a new manager and assistant manager for the Central sales district, a new product manager and assistant product manager in Wilmington, and six other new sales and development assignments.

Elbert S. Latimore has been appointed assistant to the director of sales. R. Scotten Griffin, manager of the Central district, succeeds Mr. Latimore as product manager for neoprene and Hypalon synthetic rubber. Succeeding Mr. Griffin is O. Harry McCollum, who has been assistant manager for the district. James P. Davidson, formerly a development representative, has been promoted to assistant manager for the Central district.

John R. Galloway, technical sales representative in Houston, has been transferred to Wilmington and promoted to assistant product manager for rubber chemicals. His position is being filled by Robert L. Welter. James Burt, technical sales representative, has been transferred from the New England district to the Western district, and R. Terence McSweeney has been moved from the market development group to New England as a technical sales representative. Transferring from the Elastomers Laboratory, John B. Knox and Robert H. Federroll were assigned as technical sales representatives in the Eastern and Central districts respectively, and Peter A. Peffer, Jr., is joining the market development group.

Soluslip-S1 Available

► Soluol Chemical Co., West Warwick, R. I., is marketing Soluslip-S1, a compound for lubricating the polyurethane surface of laminated fabrics during cutting, sewing and fabricating. In addition to being an effective lubricant, Soluol notes, the 35 per cent active silicone emulsion is easily prepared by diluting with cold water, and is easily applied by any contact procedure, reverse rolls being one accepted method. The company states that Soluslip-S1 has excellent stability, and any unconsumed quantity of the dilute working emulsion may be stored for future use.

Philadelphia Group Holds Golf Outing

► The Philadelphia Rubber Group held its Annual Golf Outing on August 18, 1961, at the Manufacturers' Country Club, Oreland, Penna. Two golf courses were used by the record number of 209 golfers—the Manufacturers' course and the adjacent Lulu Temple course. Wes Curtis (Naugatuck Chemical) won the Muehlstein Trophy for Low Gross, and Henry Pryor (R. E. Carroll) won the United Carbon Trophy for Second Low Gross. The DuBois Trophy for the Most Honest Golfer went to Andy Gubiczo (Alco Oil). H. Simons (Enjay Labs) was awarded the United Carbon Club for the Biggest Score on a Single Hole. Other prize winners were:

Longest Drive, Lulu Course, Roy Davis (Alco Oil) and Al Puschin (Kenrich), *Manufacturers' Course,* E. S. Paschal (Picco) and A. H. Woodward (DuPont); *Closest to Pin, Lulu Course,* Frank Shea (Kessler Chemical) and Ron Morgan (Pelmor Labs), *Manufacturers' Course,* J. B. Knox (DuPont) and Red Clark (Armstrong Cork); *Calloway,* John Baymiller (Armstrong Cork), G. McKinney (Olin Mathieson), Bob Snedeker (Union Carbide Plastics), E. Robinson (Dow Corning), Bill Brackett (Okonite), Mac Tolin (F. M. Tolin), Ted Vieock (Lee Tire), Roy Haas (American Biltrite), and V. A. Miller (International Latex); *Guest Low Gross,* J. Kearney (Thermoid); *Guest Calloway,* E. Cominsky (U.S. Rubber); *Putting Contest, Five-Way Tie,* Sid Freeman (Muehlstein), Fred Rosenstein (Synthetic Finishes), Harold Graden (Nopco Chemical), Frank Clark (Cabot), and Phil Cramer (Goodrich).

Members of the Golf Committee were: Roy Davis (Alco Oil), Jim Jones (St. Joseph Lead), Harry Sellers (A-S-H Molded Products, and George Wyrough and Tom Loser (Wyrough & Loser).

Gulf Oil Plans Unit

► Gulf Oil Corp., Pittsburgh, Penna., plans to double its ethylene capacity with the construction of a new unit, to be built on a 1,000-acre site on Cedar Bayou, thirty miles east of Houston, Texas. Construction costs were not revealed. The plant will have an ethylene capacity in excess of 400,000,000 pounds annually.

B. C. Ross

P. J. Schwert

D. W. Yochum

Pennsalt Chemicals Appoints Three

► Bryant C. Ross, Paul J. Schwert, and Daniel W. Yochum have been named to new management posts in the Rubber Chemicals Department of Pennsalt Chemicals Corp., Philadelphia, Penna. Mr. Ross moves to the position of field sales manager from manager of rubber chemicals sales promotion. He had served in the latter capacity since joining Pennsalt in 1946.

Mr. Schwert, a technical representative for the Rubber Chemicals Department since 1956, becomes product sales manager. He will be responsible for forecasting, production planning, and sales administration. Mr. Yochum has been appointed manager of the rubber technical service laboratory. He had been assistant director of the laboratory since 1947.

Copolymer Reorganizes

► Copolymer Rubber & Chemical Corp., Baton Rouge, La., has made several organizational changes in its Research and Development Division. The company's Technical and Development Departments have been discontinued, and the following three departments have been established: a Process Engineering Department, which will be responsible for all process engineering activities; a Product Quality Department, which will include quality control (rubber and butadiene), process control, technical service, and rubber laboratory development and a Pilot Plants Department, which will be responsible for all large-scale process development work of a pilot plant nature.

R. A. Gerlicher has been named manager of the Process Engineering Department, M. E. Samuels has been appointed manager of the Product Quality Department, and J. D. Sutherland has been named manager of the Pilot Plants Department. Both Mr. Gerlicher and Mr. Samuels, graduates of Massachusetts Institute of Technology and the University of Dayton, respectively, are original members of the company's supervisory staff, and have been with Copolymer since its inception in 1943. Mr. Sutherland, a graduate of Louisiana State University, has been with Copolymer since 1950.

New U.S. Rubber Tire

► A new, low-profile tire which reportedly incorporates several quality improvements for longer mileage and safer turnpike driving at sustained high speeds is being produced by the U. S. Rubber Co., New York, N. Y., for the forthcoming 1962 model cars. Called the U. S. Royal Safety 800, the tire was selected after 10 million miles of testing on the road and on the company's high speed track at Lancaster, Calif. Four advantages to motorists cited by the company are: more tread mileage than the tire it replaces, and up to 25 per cent more mileage than comparable competitive tires; a new adhesive for bonding the tire cord and the carcass rubber of the tire, making it one of the safest tires ever developed for turnpike speeds; a tread pattern built in five rows instead of seven, with angular slotting for greater road grip, making the tire resistant to skidding; a low-profile design which makes the tire wider than it is high, making it cool running, reducing its power consumption and giving it added stability. The tire is being offered in both rayon and nylon cord construction as original equipment. The Safety 800 also features an extra narrow white sidewall which is available in an original equipment tire for standard-size cars.

Synthetic Facilities Undamaged by Carla

► Synthetic rubber plants in the Texas Gulf Coast area sustained little or no damage from the effects of Hurricane Carla, which hit the area on September 11 some 125 miles southeast of Houston, Texas. Heavy rain and winds up to 170 miles per hour caused the plants to shut down, enabling employes to be with their families and take necessary precautions against the storm.

Companies having synthetic rubber facilities in the hurricane area include: E. I. du Pont de Nemours & Co., Humble Oil & Refining Co., Copolymer Rubber & Chemical Corp., Firestone Tire & Rubber Co., Goodrich-Gulf Chemicals Inc., Goodyear Tire & Rubber Co., Texas-U.S. Chemical Co., U.S. Rubber Co., and United Carbon Co.

DuPont's Hypalon Works at Beaumont, Texas, suffered no physical damage, but ceased its operations on Monday, September 11, and resumed activities on Tuesday, September 12.

Humble Oil & Refining Co. ceased operations at its Bayton, Texas, refinery on Saturday, September 9, and resumed on Tuesday, September 12. There was no physical damage to the butyl plant and full production commenced on Saturday, September 16.

The hurricane had no effect on Humble's Baton Rouge, La., refinery, and the Copolymer Rubber & Chemical facilities, also at Baton Rouge. U. S. Rubber's Baton Rouge and Scott's Bluff, La., plants also were not affected by Hurricane Carla.

There was no damage to the Lake Charles, La., and Orange, Texas, plants of the Firestone Tire & Rubber Co. Both plants went off steam on Friday night, September 8, to Sunday night, September 10, with full operations beginning on Monday, September 11.

In Port Neches, Texas, Goodrich-Gulf Chemicals ceased its operations on Saturday, September 9, while Texas-U. S. halted production on Friday, September 8. Both resumed operations on Tuesday, September 12, with no physical damage.

Goodyear's synthetic unit at Houston, Texas, halted production on Saturday, September 9, and started up again on Tuesday, September 12. The facility suffered only minor damage from wind and rain.

United Carbon's synthetic rubber unit in Baytown and its carbon black facility at Aransas Pass, Texas, shut down on Sunday, September 10, and resumed production on Friday, September 15. The Baytown facility had no damage but had to delay resumption of operations due to the lack of local electrical service. The Aransas Pass black plant suffered only minor water damage, primarily in the office buildings.

Latex Bedding Shipped Reaches $11 Million

► According to the Latex Foam Rubber Council, New York, N. Y., shipments of latex rubber core mattresses totaled nearly $11 million at retail during the first six months of 1961—a dollar volume approximately 42 per cent higher than cumulative shipments of other foam core mattresses. An analysis, by the Council, of U.S. Bureau of the Census figures on total mattress and bedspring shipments during the first half of this year also showed that the 196,000 latex rubber mattresses shipped during the period had an average unit retail price of $56.09. This average unit price showed an increase of only 4/5 of 1 per cent from that of the corresponding period of 1960.

In contrast, the trade association noted, the average unit retail price of "chemical" foam core mattresses at $31.77 shows a decrease in 1961 of 19.4 per cent. The Council pointed out that a retailer realizes the same profit on one latex foam mattress that he does from the sale of four foam mattresses of the chemical type, inasmuch as mattresses are normally sold in combination with foundations which carry the same price tag as the mattress.

Report on Rubber Market

► According to a Department of Commerce report on "Concentration of Industry in Large Corporations," the tire and retreading industry is controlled by the major rubber companies. Although based on 1954 census figures, the recent government report offers an indication of conditions which prevail in the rubber industry today. The four major rubber companies, Goodyear, Firestone, U. S. Rubber, and Goodrich together claimed 78 per cent of the tire and tube market, while the eight largest companies had secured 91 per cent of the market. The tread rubber and repair materials industry was more competitive, according to the report, with the four largest manufacturers controlling 46 per cent of the retreading materials market. The eight largest producers had 62 per cent of industry sales, while the top twenty producers accounted for 81 per cent of the market.

New Cove Base Standards

► New specifications for rubber cove base and flexible vinyl cove base have been adopted and published by the Flooring Division of the Rubber Manufacturers Association, Inc., New York, N. Y. The new specifications were drafted by the Technical Committee of the Division and replace rubber cove standards which were in effect since 1957 and vinyl cove base standards in effect since 1958. Standards of quality are fixed by detailing the composition of the material and the workmanship. Dimensions are recommended and tests of the physical properties set forth. Copies of the specifications are available from the RMA.

An index to Volume 89 of RUBBER AGE will be found on pages 185 to 188 of this issue.

Expands Nytex Tire Line

► Seiberling Rubber Co., Akron, Ohio, which recently introduced its Nytex tire, the first combination nylon-rayon tire to be marketed nationally, is now applying this method of tire construction to a large segment of its passenger lines. Tires embodying the new principle were first adopted to replace all-rayon tires in the original equipment range; they are now being used to replace all-nylon in this standard line, called Super Service. In the Safety line, heaviest seller of the company's premium-level tires, all-rayon tires have been discontinued in favor of the nylon-rayon type. All-nylon is being retained.

The construction idea, trademarked Nytex in the standard line of tires, has been re-named Super Nytex for the premium tires in which it now is incorporated. The company stated that both nylon and rayon plies in the new Safety model have been strengthened, resulting in a cord body "30 per cent stronger" than the original Nytex tire.

Mooney Named 1962 Goodyear Medalist

► The rubber industry's highest honor, the annual Charles Goodyear Medal, has been won by Dr. Melvin Mooney, retired U. S. Rubber Co. scientist who made some of the most important discoveries about the behavior of rubber. Dr. Mooney's studies established a sound scientific basis for an understanding of why rubber stretches and "flows," leading to many of today's improvements in rubber processing. He will receive the 1962 Medal, named for the inventor of vulcanization, from the Division of Rubber Chemistry of the American Chemical Society at the division's Spring Meeting next April 26 in Boston, Mass.

"The Mooney name has become a household word in the rubber industry," said Dr. W. J. Sparks, scientific advisor for the Esso Research & Engineering Co. and chairman of the award committee, in announcing the award at the recent national meeting of the ACS Rubber Division in Chicago, Ill. "His development of the Mooney viscometer which measures the plasticity of rubber, and his fundamental work on the physics of rubber have established him as one of the pioneers of modern rubber technology," Dr. Sparks stated.

Dr. Mooney, who retired from U.S. Rubber's Research Center at Wayne, N.J., in 1958, devoted his 30-year career with the company to studies of rubber's elasticity, energy absorption, and other properties. His viscometer, now a standard instrument in all large rubber factories, was an important factor in controlling the quality of synthetic rubber during World War II. All synthetic rubber is now sold with a "Mooney" specification.

Melvin Mooney

Since his retirement, Dr. Mooney has written a book on world disarmament, invented a plastic violin, and served as a consulting physicist in the fields of rubber and plastics.

Dr. Mooney, a resident of Mountain Lakes, N.J., was born in Kansas City, Mo., in 1893. He received an A.B. degree from the University of Missouri in 1917. He served two years in the U.S. Army's Chemical Warfare Service in World War I, and received his Ph.D degree from the University of Chicago in 1923. After three years as a National Research Fellow, Dr. Mooney was employed for two years at the Chicago, Ill., Hawthorne Works of Western Electric Co.

He joined the Research Department of U.S. Rubber at its former general laboratories in Passaic, N.J., in 1928, and retired as a senior physicist at the Wayne Research Center on August 31, 1958. During that time he invented several instruments for measuring the properties of rubber and latex.

In addition to the Mooney viscometer, he developed a latex viscometer, two kinds of hysterometers to measure the heat build-up in rubber, and a rugosimeter to measure surface roughness. His ten patents include a molding machine, rubber springs, and a method for providing tires with an anti-skid coating. An analysis of tension winding led to electronic winding control of rubber thread for golf balls.

The Mooney viscometer, his best known invention, measures the resistance to the "flow" of rubber, thus indicating to the factory operator whether a certain batch of rubber will process properly. Dr. Mooney's device deforms the rubber in a continuous shearing operation rather than through extrusion or compression, two earlier measuring methods.

Fellow scientists credit Dr. Mooney with many advances in rheology, which is the study of the flow of materials, and inspiring many others to work in this field. He has written 35 technical articles reporting his studies.

Dr. Mooney was president of the Society of Rheology from 1936 to 1940. In 1948, the society awarded him the Bingham Medal, name for the late Prof. Eugene C. Bingham, a leader in rheology. He is a member of the ACS Rubber Division, the New York Academy of Sciences, the American Physical Society, the American Institute of Physics, Phi Beta Kappa, and Sigma Xi, the national honorary scientific fraternity.

Sawyer-Tower Buys Firm

► Sawyer-Tower, Inc., Watertown, Mass., has purchased Gamble & Hayes, Inc., another protective clothing manufacturer. The Watertown firm has announced that the Gamble & Hayes plant at Beverly, Mass., will be continued, and that company will be operated as a division of Sawyer-Tower.

Burgess Appointed

► Walter M. Burgess has been named coordinator of multiplant sales and service for the Chemical Department of McKesson & Robbins, Inc., New York, N. Y. Mr. Burgess joined the company in 1943, and has served as assistant manager and manager of the New York City chemical branch, and Northeast district manager.

Acquires Frank Chemical

► Atlantic Refining Co., Philadelphia, Penna., has acquired a controlling interest in the J. P. Frank Chemical & Plastic Corp., Brooklyn, N. Y. According to Atlantic Refining, the move represents one of the initial steps in the company's diversification program to participate in the chemical field.

South Growing Rapidly Reneau Tells ACS

► D. A. Reneau, district sales manager for the United Carbon Co., reported at a meeting of the ACS Rubber Division, held on September 7 in Chicago, Ill., that daily tire capacity in the South has grown from 5,000 units a day in 1935 to 132,500 tire units a day by 1960. The statement was made in a talk, co-authored by E. W. Howard, New York district sales manager for United Carbon, entitled "The South, Fastest Growing Rubber Area."

In his summary of the tire and tread rubber industry in the South over the past 25 years, Mr. Reneau pointed out that in 1935, the southern tire industry consisted of one tire plant, employing 700 people. Annual rated production was a mere 2.5 per cent of the 49,400,000 tires produced by the rubber industry that year. During the war years and up to 1950, the speaker continued, growth was modest. By 1950, there were six tire plants and daily production had reached 77,000 tire units per day. Annual rated capacity was 22.4 per cent of the industry. But it was during the next ten years, from 1950-1960 that the southern tire industry entered its true "growth period," the speaker declared. By 1960, existing facilities had been expanded and four new tire plants added, and the southern rubber industry was producing 25,856,000 tires, 21.5 per cent of all tires produced that year.

Some of the factors accounting for this rapid growth in the South, Mr. Reneau declared, have been an expanding market, (gross national product in the past 15 years has increased by almost 300 billion dollars, an increase of 134.7 per cent); war-time shortages of natural rubber, which forced an alliance between the rubber and oil industries and caused the manufacturer to relocate near his source of supply; low cost of utilities; and a ready supply of available skilled and unskilled labor. Since 1955, around the time the government sold the last of the polymer plants to private industry, Mr. Reneau continued, private owners have nearly doubled capacity of synthetic rubber as well, to more than 1,800,000 long tons per year.

The Southern Rubber Industry Today and Tomorrow

Plants	*1935*	*1950*	*Today*	*Tomorrow*
SBR	0	9	10	0
Cis-Polybutadiene & Cis-Polyisoprene	0	0	2	+2
Tire	1	6	10	+1
Tread Rubber	1	3	12	0
Molded and Extruded	45	85	165	+4

Rubbermaid Acquires Firm

► Rubbermaid Inc., Wooster, Ohio, has acquired Fusion Inc., Statesville, N. C., as a new subsidiary. The Wooster firm announced that limited processing is under way on the company's new line of fusion molded products. Two Wooster men have been named to supervise the new subsidiary: Robert O. Ebert will be manager and Thomas R. Schidel, chief engineer. Mr. Ebert has been with Rubbermaid since 1954, and in the last year has been project engineer on development of the fusion molding process—a system that utilizes powdered polyethylene to make tanks, drums, and refuse containers. Mr. Schidel has been with Rubbermaid for 11 years, the last six as assistant plant engineer. He has been supervising planning and construction of the new Rubbermaid factory and office in Wooster.

Building Flexzone Facility

► Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn., will erect a new plant at Geismar, La., in order to expand its production capacity for Flexzone, a chemical that sharply reduces flex-cracking and provides weather protection in tire sidewalls and treads. The multi-million dollar plant for the production of the antiozonant-antioxidant will adjoin the Monochem, Inc., project announced recently by U. S. Rubber and the Borden Co. The new unit is scheduled to go into operation in the Spring of 1963. The company said that Geismar was selected for the planned installation because it is close to raw material sources and markets. The plant will also become part of a long-term program to to make Geismar a major chemical center for the rubber company.

Firestone Dedicates Tire Unit in France

► Key officials of the Firestone Tire & Rubber Co. presided at the formal opening of a new tire plant on September 21 in Bethune, France. It is the company's first tire facility in this country. The Bethune unit, strategically located in the Pas de Calais mining area, is said to have the largest initial capacity of any foreign plant ever built by the company. Situated on an 81-acre site, the plant will produce tires and tubes for passenger cars, trucks, buses, farm equipment, motorcycles and scooters.

The company disclosed that the tire plant will make extensive use of Diene, a new polybutadiene synthetic rubber, which will be produced in a Firestone plant now under construction at Port Jerome, France. The Port Jerome united, located near Rouen, is scheduled for completion late this year. It will have an annual capacity of 25 million pounds of Diene rubber and synthetic latex. The Bethune unit, employing workers from the area, is equipped with coal-fired boilers to utilize the locally-mined fuel. The Bethune and Port Jerome projects are part of a $162 million world-wide modernization and expansion program of Firestone's plants and facilities in 1960 and 1961.

Company officials revealed that the Bethune plant was constructed to meet the rapidly expanding requirements in France, the third largest tire market in the world. It will also serve the growing demands of the Common Market. France has over five million motor vehicles and 600,000 farm tractors. The automotive industry in France is the fourth largest in the world, and its growing motor vehicle export business is now the third largest of any country.

Berti Addresses IADE

► "Considerations on Butadiene Styrene Elastomers" was the subject of a talk delivered by Dr. Eduardo Berti at a conference of the Instituto Argentino de Elastomeros (Argentine Rubber Group), held on June 22, 1961, in Buenos Aires. Dr. Berti represents the Goodyear Chemical Division in Argentina as technical adviser and field representative of the East Asiatic Co. Ltd., R.S. Pena 852, Buenos Aires, Argentina. Copies of the paper, presented in Spanish, are available free of charge.

General Gets British Oil-Extended Patent

► The British Patent Office has granted a patent to the General Tire & Rubber Co., Akron, Ohio, covering its high-Mooney oil-extended rubber development. The British Patent Office provided for the patent grant after dismissing the objection entered by the Polymer Corp., Sarnia, Canada, who claimed the development was not patentable because it was obvious in view of prior art.

Last month, the Swedish Patent Office allowed General's application for a similar patent and dismissed objections entered by Harry Onn, Trelleborgs Gummifabriks Aktiebolag, and Edstrom Trading Co., AB., who also claimed that the invention was obvious in view of prior art.

General had applied for the British and Swedish patents in 1951, at the same time as the corresponding United States filing. The United States patent was awarded in December, 1960.

General has offered licenses under the United States patent to the entire rubber industry, and has made them available throughout other areas of the world. The company has on file in Cleveland, Ohio, Federal Court suits charging infringement of its United States Patent against the Goodyear Tire & Rubber Co. and the U. S. Rubber Co. Another suit is pending in Baltimore, Md., Federal Court where General is being sued by the Firestone Tire & Rubber Co. and the McCreary Tire & Rubber Co., who are challenging the United States patent.

Rheology Group to Meet

► The 32nd Annual Meeting of the Society of Rheology will be held October 30 to November 1 in Madison, Wisc., at the Wisconsin Center, University of Wisconsin. The meeting will feature eight technical sessions, two of which will run concurrently, and a business session. Papers to be presented during the technical sessions will deal with a wide range of techniques and materials and will be of a theoretical as well as experimental nature. Some of the topics to be covered are adhesion, dynamic properties of polymers, flow birefringence, large deformations, non-Newtonian flow, cavitation dynamics and wave propagation.

C. W. Sweitzer

Named by Columbian

► Columbian Carbon Co., New York, N. Y., has appointed Dr. Carl W. Sweitzer as director of its Research Center at Princeton, N. J. The company also appointed K. A. Burgess as director of carbon black research and Frank Lyon as assistant director of carbon black research. In making these appointments, the company stressed the importance of decentralizing product research and development so that research effort can be concentrated on each major product group by those specialists who know the field from long years of experience.

Dr. Sweitzer, who will administer research on a number of product lines at Princeton, has been active for many years in research in carbon black and dispersion products. Mr. Burgess joined Columbian in research in 1946. He holds degrees from Princeton and Pennsylvania State Universities. Mr. Lyon, a graduate of Brooklyn College, has worked in research at Columbian since 1949.

Klohs Named Manager

► Daniel W. Klohs has been named manager of vinyl additives for the Nuodex Products Division of Heyden Newport Chemical Corp., New York, N. Y. He will administer sales and technical service of vinyl stabilizers, vinyl fungicides, and other vinyl additives under an accelerated program. Mr. Klohs is a graduate of Drew University with an A.B. degree, and served in the U. S. Navy during World War II. He joined Nuodex in 1958 as a technical sales representative for the Vinyl Additive Division.

Lamb Still Buying Seiberling Stock

► According to a new report filed by Edward O. Lamb with the Securities Exchange Commission, Mr. Lamb, his affiliated companies and associates now own more than 235,000 shares of common stock of the Seiberling Rubber Co. At the annual stockholders meeting on May 15 the Lamb group voted 207,556 shares which enabled them to gain a fifth seat on the 15-man Seiberling board of directors. Seiberling's management voted 360,998 proxies.

A running battle between Seiberling management and Mr. Lamb, largest stockholder in the company, began in 1956 when Mr. Lamb conducted a proxy fight for control of the company, eighth largest rubber manufacturer in the United States. At that time the Lamb group won four seats on the board of directors, which were maintained in the interim.

Financial experts are of the opinion that the continued acquisition of Seiberling common by the Lamb group indicates a possible proxy fight in 1962 for control of Seiberling. The Lamb group now controls approximately 39.4 per cent of voting stock, compared to 36.5 per cent it voted at the last annual meeting.

Form Ancon Chemical

► A new petrochemical company, Ancon Chemical Corp., has been formed by the Ansul Chemical Co., Marinette, Wisc., and the Continental Oil Co., Houston, Texas. Ancon will be operated as a jointly-owned subsidiary of both Ansul and Conoco, and will produce methyl chloride at a facility now under construction at Lake Charles, La. The unit is scheduled to go on stream in early 1962 and is expected to have an annual production capacity of 60 million pounds of methyl chloride. The new unit's output will be distributed exclusively by Ansul and is expected to be used primarily by manufacturers of butyl rubber and silicones as well as tetramethylead, methyl cellulose, and quaternary ammonium compounds.

► The Rubber Growers' Association (Inc.), London, England, has published the 52nd Report of the Council to the members of the Association, including a statement of accounts for 1960.

More Tread Mileage From Goodyear Budene

► A new synthetic rubber, said to provide 35 per cent more tread mileage and eventually may nearly double tire life, will go into production in October at the Beaumont, Texas, plant of the Goodyear Tire & Rubber Co. According to H. R. Thies, general manager of the Akron firm's Chemical Division, the new *cis*-polybutadiene rubber, called Budene, is the result of an investment of $5 million in research and development. Available in staining or non-staining types, Budene can be substituted for natural or SBR rubbers in varying amounts, according to the intended end use. As a supplementary material, it improves the over-all physical properties of either natural or other types of synthetic rubber, it was explained.

Laboratory tests confirmed by over 3 million miles of road testing showed that Budene substantially improves carcass durability in both passenger and truck tires, lowers operating temperature, and markedly improves tread wear. It was pointed out that tread wear may be improved as much as 90 per cent if methods are developed to use pure Budene in tire treads.

Characteristics Described

Performance characteristics of Budene were described by Goodyear chemist R. J. Brown in a paper presented at the ACS Rubber Division meeting on September 7 in Chicago, Ill. In describing application and compounding principles which apply specifically to high-*cis* content such as Budene, Mr. Brown said that Budene is a successful natural rubber replacement in applications such as tire carcasses where high resilience and low heat build-up are desirable. In addition, it is equally successful as an SBR replacement where abrasion resistance is the prime requisite. He pointed out that Budene can and should be blended with either natural rubber or SBR for easy processing in existing factory equipment.

In regards to additives, Mr. Brown stated that Budene is extremely sensitive to sulfur level and requires less sulfur than either SBR or natural rubber to establish a tight cure. He added that it is desirable to add oil to bring out the maximum benefit from the use of the new synthetic rubber in tread stocks, however, this is true only if the proper type of oil is added. According to the Goodyear chemist, petroleum oil is superior to additives derived from naval stores.

A technician is shown checking the vast difference in tread wear on this test tire, driven more than 15,000 miles under heavy load conditions. The upper half was made from Budene, Goodyear's new *cis*-polybutadiene synthetic rubber, while the lower half was made from conventional synthetic rubber.

In addition, Budene is sensitive about the type of carbon black used for tire applications. Mr. Brown stated that it shows a definite preference to ISAF black for maximum abrasion resistance.

Goodyear has been awarded several foreign patents on the low sulfur-oil-ISAF black compounding techniques. A United States patent application is pending.

Expanding Vyrene Output

► U. S. Rubber Co. has begun an expansion program at its Gastonia, N. C., plant that will double production facilities of Vyrene, the company's new Spandex synthetic elastic thread. The expansion, the second of these facilities in 1961, is expected to be completed by the end of August, 1961. The company reports that it is planning still further expansions of the Vyrene production facilities in the third and fourth quarters of this year to meet the growing demand from manufacturers of swimwear and foundation garments.

An index to Volume 89 of RUBBER AGE will be found on pages 185 to 188 of this issue.

Replanting Program Aids Smallholders

► Since 1953, some 373,000 smallholder acres have been replanted with the latest type of high producing rubbers, according to the Natural Rubber Bureau. The program has involved grants to the smallholders of Malaya, Sarawak, and North Borneo of some $45,000,000. In Sarawak, an $11,000,000 replanting program is being instituted that is geared to put high yielding stock into some 90,000 acres by 1964. In Borneo, similar replanting efforts are under way. The smallholder grants for this purpose are financed by a direct tax on rubber exports.

In a world economy that has been absorbing all the natural rubber that can be produced, the small farmer who can grow more rubber per given acreage will have more rubber to sell and can profit at a lower price. That being the case, the Malayan rubber industry is interested in seeing that, insofar as possible, the three- to six-acre producer gets his rubber out as efficiently as the 5,000-acre plantation owner. This also increases the ability of natural rubber to compete with synthetic on the world market. A Rubber Industry (Replanting) Board has been set up in Malaya which helped small farmers replant some 75,000 acres of rubber land in 1960 with the same high-yielding stocks used on the largest estates. Combining estate and smallholder production, the average Malayan yield today is 490 pounds per year per acre, according to the Natural Rubber Bureau, Washington, D. C. When it comes into full bearing, the new material now being introduced is expected to double and triple this output — and the farmer's income along with it.

G-E Appoints Billman

► Neil E. Billman has been named East Central district sales representative for the Silicone Products Department of General Electric Co., Waterford, N. Y. Mr. Billman will be headquartered at Oak Park, Mich. A graduate of Ohio State University, where he received a B.S. degree in technical education, Mr. Billman joined G-E in 1953 in the Advertising and Sales Promotion Section of the G-E Supply Co. In 1957, he joined the firm's Laminated Products Department as a field sales representative assigned to the Los Angeles area.

DuPont and Phillips Settle Patent Dispute

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has moved to dismiss its three-year-old law suit against Phillips Petroleum Co., Bartlesville, Okla., following an out-of-court settlement of the litigation over DuPont's composition-of-matter patent on high-density polyethylene. A statement issued by DuPont revealed that the settlement involves an exchange of patent rights. Although the statement did not indicate whether the settlement involves royalty payments, there has been speculation that the "exchange of patent rights" may mean that the two firms will grant each other royalty-free licenses.

The DuPont patent involved in the suit, U.S. Patent No. 2,816,883, was issued on Dec. 17, 1957. It is a composition of matter patent covering high density polyethylene "no matter how it is manufactured." At the time the patent was issued, a DuPont spokesman said, "Our composition of matter claims, which are free of any process limitation, define linear polyethylene in terms of its chemical structure and several typical physical properties. . . . So long as the product which is formed meets the terms of the product claims, it is dominated by the composition of matter patent." DuPont filed suit against Phillips Petroleum in June, 1958, asking for an injunction against Phillips' manufacture and sale of high density polyethylene. The three licensees of the Phillips process for making high density polyethylene — Celanese Corp. of America, New York, N. Y., W. R. Grace & Co., Clifton, N. J., and Union Carbide Plastics Co., Newark, N. J.—will not be affected by the DuPont-Phillips agreement.

G-E Names Schroeder

► General Electric Co., Waterford, N.Y., has appointed G. J. Schroeder as sales representative for the central district of its Silicone Products Department, located in Chicago, Ill. Mr. Schroeder holds an M.B.A. degree from DePaul University, acquired in 1959, and a B.S. degree in marketing from the University of Indiana. He joined General Electric early in 1960 on the company's marketing training program. Since early this year, he has been assigned to the Silicone Products Department in Waterford as a salesman in training.

R. F. Ellis

Awarded SRG Scholarship

► Robert F. Ellis has been awarded the Harmon Connell Memorial Scholarship, established by the Southern Rubber Group at Mississippi State University in honor of the memory of Harmon Connell, first chairman of the group and a graduate of Mississippi State University. Mr. Ellis is the fifth recipient of the scholarship. A native of West Point, Miss., he will be a senior at the university during the 1961-1962 semester.

U.S. Rubber Expands Unit

► U.S. Rubber Co., New York, N.Y., will spend $1.1 million on further expansion and modernization of its cotton yarn manufacturing facilities in its Winnsboro, S. C. plant. The new expansion and modernization program for cotton yarn facilities will be completed in about a year. It is the third such expansion to be undertaken at Winnsboro during the last year, and brings the company's expenditures for modernization at this location to more $3.5 million since the summer of 1960.

The cotton yarn manufactured at Winnsboro is used in rubber products requiring cotton backing, such as certain types of footwear and stretchable Naugahyde, the latter used in upholstery. Other projects at the Winnsboro plant have included construction of a new $1.5 million nylon tire fabric production unit, scheduled for completion by December of this year, and a $1 million expansion and modernization program of its nylon and rayon cord twisting facilities, completed in October.

Vinyls Featured On SPE Retec Program

► Vinyls will be the subject of a Regional Technical Conference of the Society of Plastics Engineers, to be held on November 15 at the Statler Hilton Hotel in New York City. Papers selected for presentation at the Retec on "Vinyl Plastics in the Household" cover both vinyl applications, in flooring and telephones, for example, and vinyl technology including standards, color matching, and new materials. The conference is being sponsored by the New York Section of SPE. The eight papers to be presented are:

Morning Session, "Vinyls in Telephone Usage" by John B. deCoste (Bell Telephone Laboratories); "Effect of Fillers on Properties of Vinyl Flooring Compositions" by A. W. McKee (Armstrong Cork); "Formulation of Low Staining Vinyl Flooring Compositions" by Joseph Fath (Thompson Chemical); "Vinyl Plastics Standards" by Frank W. Reinhart (National Bureau of Standards).

Afternoon Session, "Effect of Processing Conditions and Plasticizer Choice on Physical Properties of PVC" by Peter W. Spink (Monsanto Chemical); "Hi Temp Formulations from End Use Considerations" by Robert T. Holtz (Goodrich Chemical); "Correlation of Vinyl Light Stability Data" by Abe Scarborough (National Lead); "CIE System of Color Measurement, as Used for Practical Production Color Match Problems" by R. Landry (Davidson & Hemmindinger).

Enjay Names Three

► Enjay Chemical Co., New York, N. Y., has assigned a resident butyl latex representative to each of its three marketing divisions—Eastern, Central and Western. They are John B. Winkler, Plainfield, N. J.; Peter M. Heard, Akron, Ohio; and David H. Hess, Jr., Los Angeles, Calif. Mr. Winkler is a graduate of La Salle College, with a B.A. degree in chemistry. He joined the company in 1960 after a period with the Alco Oil & Chemical Corp. Mr. Heard earned his B.S. degree in chemical engineering at Syracuse University in 1957. He served at the Humble Oil & Refining Co. until he joined Enjay last year. Mr. Hess received his B.A. degree in mechanical engineering at the University of Akron. He joined the company a year ago.

Wire and Cable Group Schedules 25 Papers

► Twenty-five papers will be presented in five technical sessions at the Tenth Annual Wire and Cable Symposium, to be held from November 29 to December 1, 1961, at the Berkeley-Carteret Hotel in Asbury Park, N. J. The symposium is jointly sponsored by the U.S. Army Signal Research and Development Laboratory (USASRDL) and industry. Howard F. X. Kingsley (USASRDL) will be general chairman of the three-day meeting and Fred W. Wills (USASRDL) will serve as co-chairman.

The papers to be presented will show the technical progress during the preceding year in the field of communication wires and cables. The technical program follows:

November 29, 9:15 a.m., Chairman, S. Montgomery, Jr. (Montgomery Co.): "Changing Pattern of Telephone Outside Plant" by W. J. Lally (Bell Telephone Labs.); "Chemically Cross-Linked Polyethylene" by T. H. Ling (Anaconda Wire & Cable); "Irradiated Lightweight Miniature Coaxial Cable" by V. L. Lanza (Raychem Corp.); "A New Concept in Semi-Solid Dielectric Coaxial Cable" by C. C. Camillo and O. A. Mannella (R-F Products Division, Amphenol-Borg Electronics); "A New Approach to Compounding for High Temperature Vinyl Wire Insulation" by J. Fath and S. G. Grille (Thompson Chemical).

November 29, 2:00 p.m., Chairman, C. T. Wyman (Bell Telephone Labs.): "Long Span Insulated Open Wire Telephone Plant" by C. R. Ballard, H. Ericson, H. B. Lee and G. A. Lohsl (Rural Electrification Administration, USDA); "A Dual Insulated Terminating Cable" by G. H. Webster (Bell Telephone Labs.); "Longitudinal Application of Insulation and Shields on Communication Cables" by H. W. Budenbender (Western Electric); "Cellular Insulation for Communication Cable" by B. B. Pusey (Union Carbide Plastics); "The Influence of Extruder Geometry in the Production of Homogeneous Cellular Plastic Insulation" by E. O. Bauer and P. E. Fox (Bell Telephone Labs.); "Cellular Vinyl Wire Insulation" by R. M. Downing, J. H. Hook, and L. T. Staats, Jr. (DuPont).

November 30, 9:15 a.m., Chairman, R. L. Spade (Belden Mfg.): "Electrical Fatigue and Dielectric Strength in Teflon TFE Insulation" by D. E. Foster, R. T. Guthrie, and H. E. Pendergast (American Enka); "Factors Influencing Accelerated Ozone Testing and Weathering of Cable Compositions" by W. J. Yurgen, S. Palinchak, and P. B. Stickney (Battelle Memorial Institute); "Water Absorption of Elastomers" by G. J. Briggs, D. C. Edwards, and E. B. Storey (Polymer Corp., Sarnia); "The Properties of Esters of Trimellitic Anhydride in Vinyl Insulation" by R. J. Lawn (Pittsburgh Chemical); "Silicone Rubber Layer Construction for High Voltage Insulation" by S. J. Nizinski (Dow Corning).

November 30, 2:00 p.m., Chairman, W. P. Acton (Hercules Powder): "Standardization of Wire Terminations Employed in Military Equipment" by R. O. Beach and C. W. Wilson (American Machine & Foundry); "Wires and Cables for Submarine Radio Systems" by K. L. Blaisdell (Underwater Sound Laboratory, U. S. Navy); "A New Attenuating Conductor for Reducing Radio Frequency Noise Found on Ordinary Power Distribution Lines" by J. L. Brooks and D. B. Clark (Civil Engineering Laboratory, U.S. Navy); "Underwater Cable Conductors and Terminations for Hydrostatic Pressures 1,000 to 10,000 PSI" by R. A. Swan and G. C. Thym (Joy Mfg.); "The Quina: A Submarine Cable for Audio and Carrier Frequencies" by B. Portoletto and R. Monelli (Pirelli, Italy).

December 1, 9:15 a.m., Chairman, R. P. Houlihan (Gavitt Wire & Cable): "Corrugated Metallic Sheath for Communication and Data Transmission Cable" by K. P. Roberts and P. H. Ware (Simplex Wire & Cable); "An Approach to Optimization of Missile Cable System Design" by W. Gilmore (Raytheon Mfg.) and B. Kirshtein (Frankford Arsenal); "Development of Lightweight Support Cables for Quick Reaction Missile Systems" by W. Rigling (Martin Co.); "Checkout Cables for an Air-to-Surface Missile" by F. K. Gill (North American Aviation).

Karman Rubber Expands

► Karman Rubber Co., Akron, Ohio, is constructing a 5,000 square foot addition to its plant as part of a program designed to double the company's floor space by 1962. Karman produces molded rubber goods as well as the direct drive for record player turntables.

Drogin Sees Advances For Carbon Black

► Current carbon black production techniques could radically change if several processes now being investigated in chemical research laboratories are successful, predicts Dr. I. Drogin, vice-president of the United Carbon Co., New York, N. Y. According to Dr. Drogin, several factors will control the extent of future technical advances in carbon black manufacture and the development of new and improved quality carbon blacks.

One factor, Dr. Drogin points out, could be the creation of either new or special polymers which will have to depend upon carbon black for reinforcement. The progress made in better adaption of carbon black in existing polymer could be another factor influencing the technical advances of carbon black. A third factor cited by Dr. Drogin is the demands of automobile manufacturers for tires in keeping with the requirements of new cars for improved riding qualities, better road performance, and added safety.

Goodyear Nylon Tire

► The Goodyear Tire & Rubber Co., Akron, Ohio, has introduced a new nylon replacement tire, called the Nylon Safety All Weather, in compact and imported car sizes. The tread design has been adapated from the 1960 original equipment design, and has built into it the same 3-T nylon cord that goes into the company's premium Double Eagle. The name 3-T is derived from a combination of time, temperature and tension that sets the cord at its maximum point of strength and resiliency, the company states. The Safety All Weather is also available for standard model cars.

Borden Buys Columbus

► Borden Co., New York, N. Y., has acquired the business of Columbus Coated Fabrics Corp., Columbus, Ohio. Terms of the purchase were not disclosed. The Ohio firm will continue with its present management, name, and organization, and will operate as a division of the Borden Chemical Co., a division of the Borden Co. C. Gordon Jelliffe, president of Columbus Coated, has been named president and principal operating officer of the new division.

NEW, FROM

McNEIL AKRON

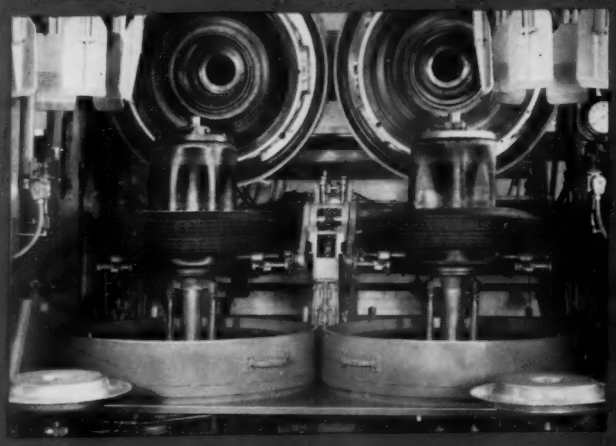
THE WORLD'S

FINEST PASSENGER TIRE PRESS

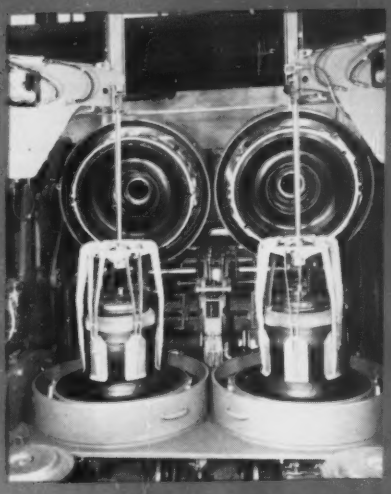
THE 40"
BAG-O-MATIC®

Fast Operating Cycle — 51 to 54 Seconds.
Positive, Accurate Tire Positioning And Handling.
Wide Curing Size Range With Only Simple Adjustments.
Maximum Production With Minimum Maintenance.

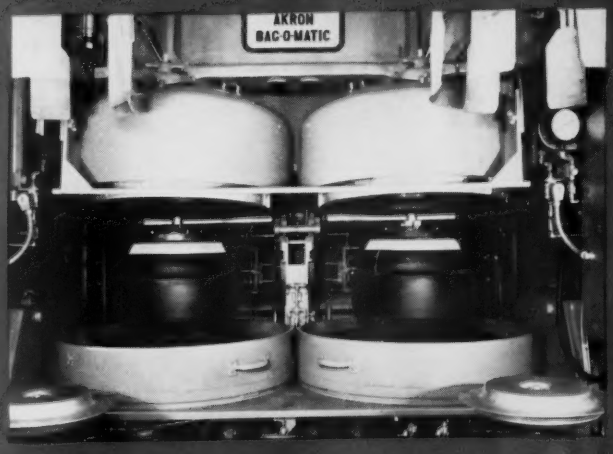
NOW, LESS THAN 1 MINUTE FOR A COMPLETE OPERATING CYCLE



1 Center Mechanism lifts tires. Unloading arms have moved under tires.



4 Uncured tires are positively positioned over center mechanisms and registered on lower bead rings.

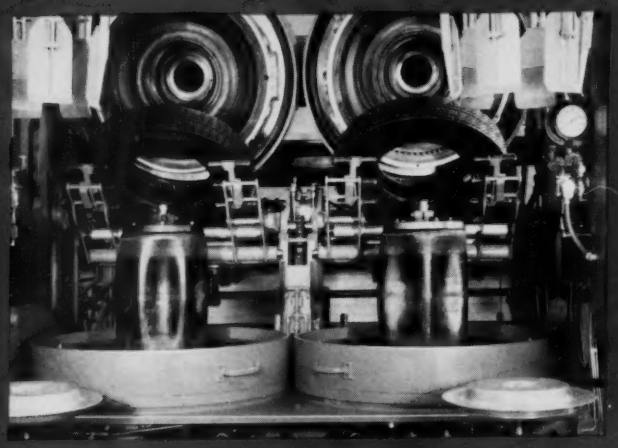


5 Press closes, shaping and curing the tires.

IMPORTANT OPERATING FEATURES

1. Press operating cycle shortest ever! *LESS THAN ONE MINUTE.* Averages 51 to 54 seconds from automatic activation of "press open" circuit through unloading, loading, shaping to fully closed. Accomplished by a faster drive plus a "speed-up" in the loading and unloading operations.
2. All new vertical chuck loader accurately and positively places uncured tire over the bladder onto the lower bead ring — *EVERY TIME!* Six loader shoes assure roundness of casings. Four uncured tires are ready for next two cures. (See illustrations #3 and #4)
3. Completely new unloader arms move under cured tires to carry them upward and out the rear of the Bag-O-Matic. Tires are supported under both sides and across the rear of the sidewalls. Cam controlled rear tipping action insures accurate movement of the tire into the post cure inflator. These new unloading arms are effective on today's wide variety of tires including more flexible, two-ply tires, 70 level, and Nylon low-profile casings. (See illustrations #1 and #2)
4. The new "Jet-Ejector" *eliminates the need* for an elaborate vacuum system. This water-

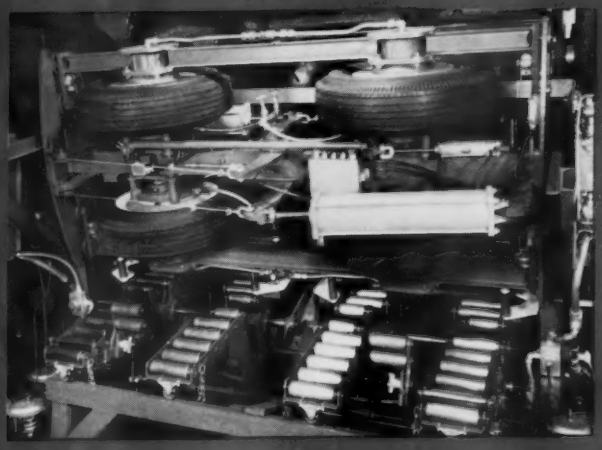
LOOK TO McNEIL FOR



2 Unloading arms remove tires from bag assembly and slide tires onto takeaway conveyor (or Post Inflator).

3 Loading chucks position uncured tires over bag assemblies.

6 Two tires being held in position for post inflation.



7 Two additional tires are accepted by Post Inflator as tires are unloaded.

OF THE NEW 40" BAG-O-MATIC®

operated Venturi unit creates vacuum as required for rapid bladder drainage and positive bladder folding for subsequent automatic loading. Provides dependable vacuum for each press individually.

5 50 to 100% better bladder life with Passenger Tire Bag-O-Matics®. Many tire plants are enjoying bag life averages above 1000 cures.

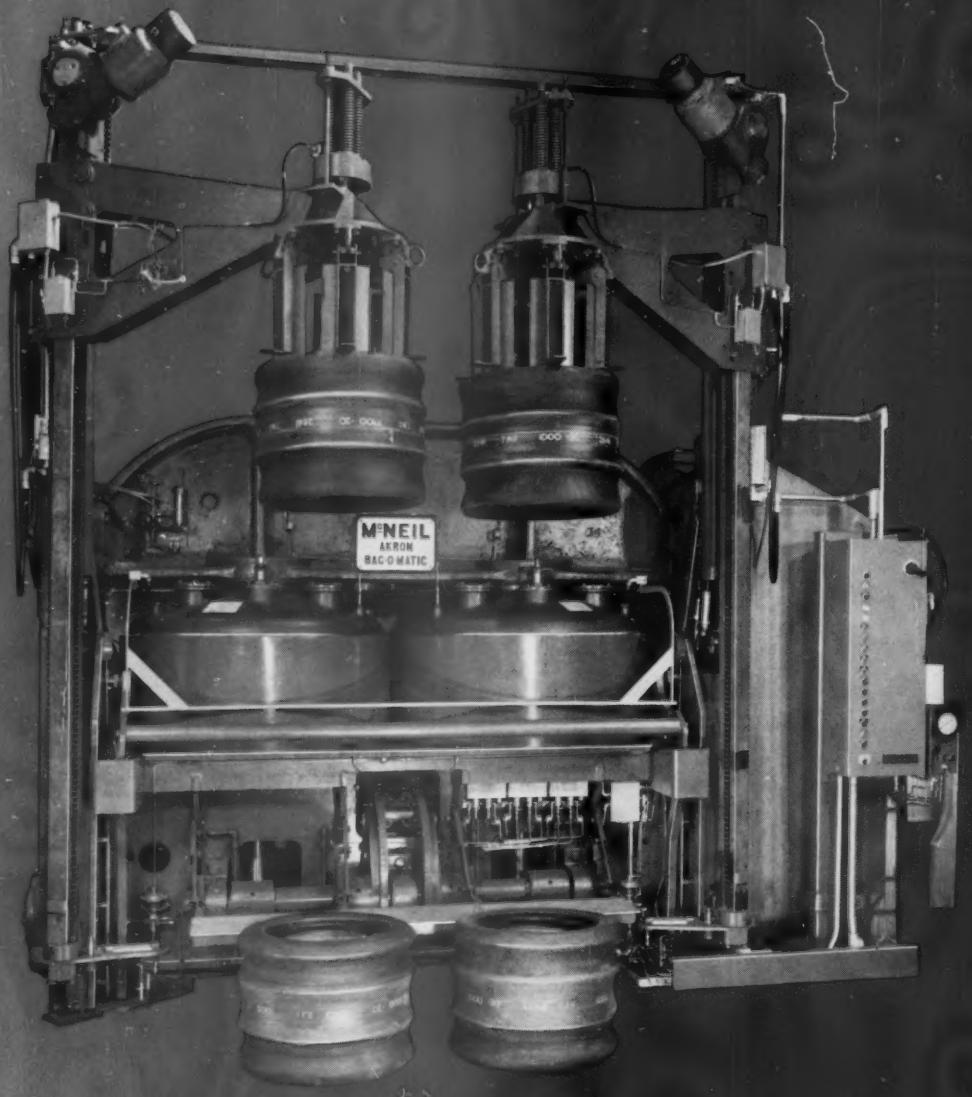
6 McNeil Load Indicating Gauges accurately measure the elongation of the side links as the Bag-O-Matic® goes "on squeeze". Gauges show the exact pressure on the individual molds. This allows fast and accurate press adjustment for the tire being cured and the internal pressure being used.

7 Complete versatility — a range of 12" through 17" rim diameter tires are accepted by the 40" Bag-O-Matic® with simple adjustments—no basic press changes are needed.

8 By an overwhelming majority Bag-O-Matic presses continue to be the first choice of tire manufacturers, world-wide.

LEADERSHIP IN CURING PRESSES

INDUSTRY'S STANDARD FOR TRUCK TIRE CURING SINCE 1951



FOREIGN LICENSES: Francis Shaw & Company, Ltd., Manchester, England; Vickers-Ruwolt Proprietary, Ltd., Victoria, Australia; Anciens Etablissements Ripiquet, Bobigny, France; Fried, Krupp-Harburger Eisen-und Bronzewerke A.G., Hamburg, Germany; Luigi Pomini, Castellanza, Italy; The Kobe Steel Works, Ltd., Kobe, Japan; Aktiebolaget Abjorn Anderson, Svedala, Sweden.

THE McNEIL 55" BAG-O-MATIC®

- Accurate, concentric positioning of uncured tires onto the lower bead rings. Chucks stay in position during lowering of top rings to established bead height, and insure correct bag location.
- Complete versatility — press handles 15" through 24" bead diameters and there are no pots to change.
- 55" Bag-O-Matic® presses will handle single bead, dual bead, or wire tires.

McNEIL AKRON

THE McNEIL MACHINE & ENGINEERING CO.

96 E. Crosier St., at Sweitzer Ave. Akron 11, Ohio

C. F. Anagnostopoulos

Promoted by Monsanto

► Dr. Constantine E. Anagnostopoulos has been appointed assistant director of research for the Organic Chemicals Division of the Monsanto Chemical Co., St. Louis, Mo. Dr. Anagnostopoulos will transfer to Nitro, West Va., where he will be in charge of the division's laboratories there. A native of Greece, Dr. Anagnostopoulos received his B.S. degree in chemistry from Brown University in 1949, and his Ph.D. degree in chemistry from Harvard University in 1952. He joined Monsanto that year as a member of the Research Department of the company's former Merrimac Division at Everett, Mass. When Monsanto was reorganized in 1954, he became a member of the Research Department of the firm's Organic Division, and was appointed a scientist in 1957. Dr. Anagnostopoulos is the author of numerous technical papers and holds several patents.

New Latex Foam Reported

► A new type of latex foam, which promises to reduce markedly the fire hazard now inherent in upholstered furniture, is described in the current issue of *Rubber Developments,* a quarterly journal on natural rubber research. Past attempts to produce such a rubber have failed because the combustion-retarding elements used in the compounding — chlorinated hydrocarbons, ammonium salts, borates, tartrates and metallic oxides—tended to diminish the elastic properties of the finished foam rubber. This problem was overcome when a research team, taking a new tack, chemically modified natural rubber so that flame resistance is "built into" the rubber molecule.

Labor Notes

► Thirteen hundred striking workers at the Passaic, N. J., plant of the U. S. Rubber Co. returned to work on August 30, following acceptance of a new proposal regarding payment of piece workers. Members of Local 217, United Rubber Workers Union, had been on strike since August 15 over a company proposal that former piece-work employees be paid 90 per cent of what they earned before they were transferred to other work. Under the new agreement, the company proposes payment of 92 per cent. The agreement, accepted by a vote of two to one, includes a 150-day trial period, after which the union may reject the agreement or the company may decide that 92 per cent is not feasible.

► The URW has secured a new companywide contract with the Armstrong Rubber Co., West Haven, Conn., providing for four weeks of vacation after 20 years of service. The four weeks for 20 years vacation provision was the first to be gained in URW companywide negotiations. Pay increases as established in contracts signed with the other major rubber companies (7½c-3½c pattern in 1961 and 7c-4c in 1962) and improved working conditions were other contract improvements made in the new Armstrong agreement.

► U. S. Rubber Reclaiming Co. in Buffalo, N. Y., has signed a new contract with URW Local 222, providing for 7½c an hour in wage increases in two steps. The agreement provides for a 3½c hourly increase, effective June 19, 1961, and a 4c increase, effective June 18, 1962. The contract runs until September 15, 1963. Another important provision is for three weeks of vacation after ten years of service, and four weeks after 22 years.

► Mansfield Tire & Rubber Co., Mansfield, Ohio, has told the United Rubber Workers that it may move its production facilities out of Mansfield unless the union agrees to revise certain contract stipulations and working practices. The company said that its current costs are out of line with other companies in the industry.

R. R. Stimets, Sr.

Named by United Carbon

► Richard R. Stimets, Sr., has been appointed Boston district sales manager for United Carbon Co., Inc., New York, N. Y. He succeeds William A. Maguire who retired on September 1 after 36 years' association with the rubber industry. Mr. Stimets received his Masters degree from Boston University in 1959 and joined United Carbon that same year as a sales representative covering the New England area. Mr. Stimets is a member of the Boston, Rhode Island, Connecticut, and New York Rubber Groups.

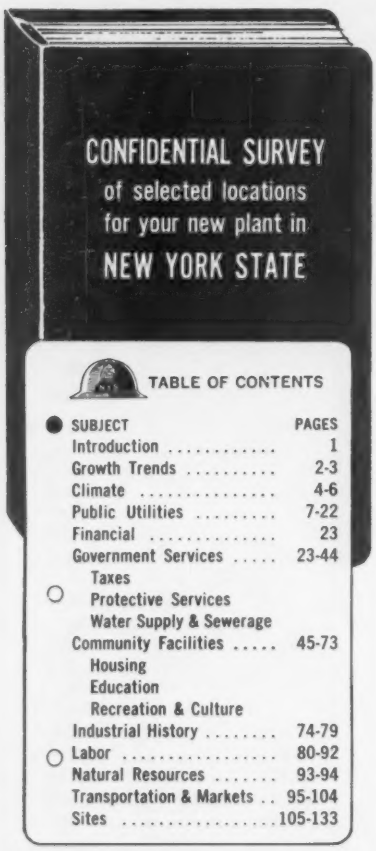
Introduces Harflex 340

► The Harchem Division of Wallace & Tiernan Inc., Belleville, N. J., has introduced a polar polymeric plasticizer, for use with polyvinyl acetate, called Harflex 340. The new plasticizer is said to impart wet tack, specific adhesion and permanence to polyvinyl acetate adhesives not previously attainable. The company states that Harflex 340 has been approved for food usage by the Food and Drug Administration. Other suggested applications include carpet backing compounds, binders for nonwoven fabrics, laminating adhesives and barrier coatings.

Named Export Agent

► General Tire & Rubber Export Co., Akron, Ohio, has been appointed export agent for the products of Electric Hose & Rubber Co., Wilmington, Del. General's export division will market the hose through distributors in foreign markets throughout the world, exclusive of the United States, Canada, and the British Isles.

FREE TO COMPANY OFFICIALS LOOKING FOR A NEW PLANT SITE



TAILOR-MADE REPORTS. The table of contents shown above is typical of the survey of selected plant locations that we will prepare for your organization. Simply send your specific requirements on your business letterhead to Commissioner Keith S. McHugh, New York State Department of Commerce, Room 4707 112 State Street, Albany 7, N. Y.

Keith S McHugh

Keith S. McHugh, Commissioner
New York State Department of Commerce

Hoggson & Pettis Mfg. Co. Moves To Custom Designed Facility

One of the rubber industry's oldest and largest equipment suppliers is taking a significant step forward this Fall—a step which will provide the rubber industry with more molds, dies, and tools for a myriad of operations wherever and whenever they are needed. The Hoggson & Pettis Manufacturing Co., founded 112 years ago, in 1849, moved into a new custom designed, modern plant near New Haven, Conn., on October 2, 1961.

The plant, located in Orange, Conn., cost $250,000 and will provide 21,000 square feet of space for manufacturing and administration. The one-story layout of the new building offers greater efficiency and versatility than the space formerly occupied by the company in an older, multi-story building in New Haven proper.

Seventh Home

This will be the seventh home for Hoggson & Pettis, which had its origin in a rented room in New Haven when Samuel Hoggson, newly arrived from Ireland in 1849, offered his services as an expert engraver and die-sinker to local industry. Much of his early business came from the young rubber industry in Connecticut, which was just then being revolutionized by another New Haven man, Charles Goodyear. Mr. Hoggson began to turn out the ancestors of the molds and dies and rollers for shoe soles, mats, tires, and hundreds of other rubber goods which are the company's specialty to this day. He also designed and began manufacturing a line of hand tools for cementing and vulcanizing and other manufacturing operations.

Many Inventions

Mr. Hoggson contributed many inventions to the field of rubber processing. One of the first was the process of engraving rubber by calendar roller, replacing the slow and tedious hand-engraving methods then necessary. Hoggson & Pettis is still a leading manufacturer of the calendar engraving rollers invented by its founder.

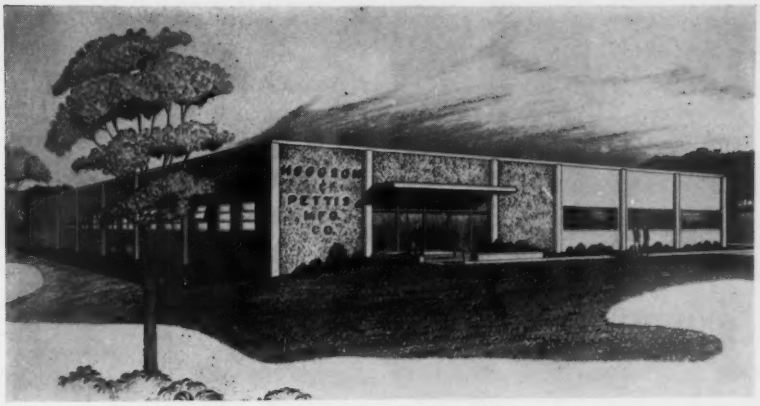
George C. Pettis joined the growing Hoggson firm in 1879 as a partner. By that time, product lines had been increased in size and variety, with the inclusion of such diversified precision products as stamping and marking devices for metalworking and other industries, stops for pipe and reed organs. Shortly thereafter, in 1882, the newly incorporated firm of Hoggson & Pettis made its first major move to new and larger quarters. The following year, a new building was built, and the firm moved again.

In the ensuing years, diversification became even more of a watchword with Hoggson & Pettis. For example, a line of ticket punches such as those used by railroad conductors, was added to the Hoggson line. While maintaining their reputation as specialists in rubber industry equipment, the firm became an early manufacturer of an experimental typewriter called the Morris, produced a popular line of lathe chucks, made items ranging from hair curlers to mop wringers, and earned the distinction of building the engine for the first "horseless carriage" in New Haven. The pioneer automobile was built in 1896 for inventor E. W. Clapp, and its construction and trial runs were supervised by Frank D. Willis, a Hoggson & Pettis employee whose son, John K. Willis, is now the firm's president.

Another Move

In 1906, another move was necessitated by the acquisition of Hoggson & Pettis' plant site by the then expanding New Haven Railroad. Of even greater significance in the company's history was the assumption of ownership-management of the firm by a group of employees who had been with the company since they entered years before as apprentices to Messrs. Hoggson and Pettis. The founder had by this time retired, and Mr. Pettis had died.

The new management, which included Harry B. Kennedy, now chairman of the board and celebrating 75 years of continuous service with the firm, and George P. Stephan, Sr., father of current president emeritus George P. Stephan, Jr., and the present treasurer Carl A. Stephan, continued at the new location until 1912, when fire gutted the building. The company then



An artist's drawing of the new office and manufacturing building of the Hoggson & Pettis Manufacturing Co. in Orange, Conn. The 112-year old rubber industry equipment supplier occupied the new quarters on October 2, 1961.

moved to the plant on New Haven's Brewery Street which it has occupied until this year.

John K. Willis, who was elected president of Hoggson & Pettis early this year, says that the present move is the most significant in the century-plus history of his company, since it will provide unprecedented manufacturing efficiency under the most modern conditions. Mr. Willis should know, for not only was his father a Hoggson & Pettis employee, but his grandfather, N. P. H. Willis, was superintendent of the plant in the early days of the company. The new plant, he adds, has been designed to facilitate doubling the manufacturing area when the need arises.

Unusual Construction

The new building employs the unusual construction features of precast concrete, and tilt-up wall panels 28 feet wide by 20 feet high as the entire outerwall. Bays 28 by 50 feet provide large, open flexible manufacturing space. Panels on the facade of the new plant, located at 22 Prindle Hill Road, Orange, have been executed with exposed aggregate faces of native stone in keeping with the long-standing tie between Hoggson & Pettis and the New Haven scene.

Among the products which will be produced by Hoggson & Pettis at their new location are marking dies for the rubber and plastics industries, as well as for the metals, paper, leather, and wood fields; molds and dies for rubber, plastic, and synthetic materials manufacturers; a constantly tested and developed line of rubber manufacturers' tools; and the company's wide variety of "XL" punches for railroad tickets, industrial marking, and commercial use.

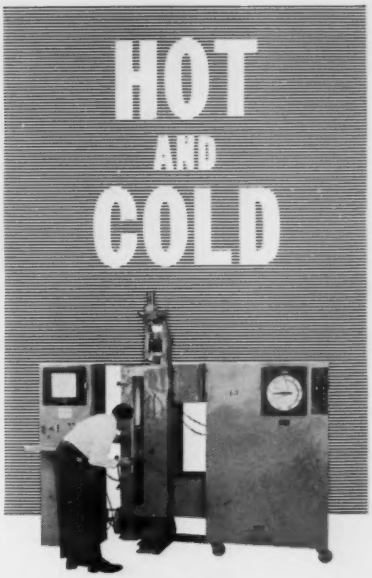
In the rubber field, specialties include "dumbbell" dies for tension testing, cup molds, spiders, abrasion test molds, sole molds, size markers, and custom product molds. According to Mr. Willis, test molds now account for a greater part of the company's output than ever before because of the increased demand from development laboratories throughout the industry.

Other Products

Hoggson & Pettis hand tools for cementing and vulcanizing comprise a multitude of stitchers, cleaners, awls, and rollers with concave, convex, bevel, knurled, porcupine, and other varieties of heads. The long-established manufacturing concern is the only manufacturer of hand and machine tools for cementing and vulcanizing in the eastern part of the nation. Its line of hand tools for the industry has increased from about half-a-dozen varieties toward the end of the nineteenth century to about 2,000 today.

Hoggson & Pettis customers for a century or more have included leading tire, footwear, and rubber goods manufacturers, as well as the United States Government. During World War II, the company devoted 75 to 80 per cent of its manufacturing activities to the military. Today, Hoggson & Pettis' products are in use on and in connection with such vital projects as the Polaris-type nuclear submarines, and the Redstone rocket, among others.

An index to Volume 89 of RUBBER AGE will be found on pages 185 to 188 of this issue.



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Here's the complete package for testing elastomers at both high and low temperatures! Model L-8 offers the combination of a full-length test chamber, conditioning cabinet, and automatic temperature controls (from −90° to +600°F) . . . for evaluating stress, elongation, and tear resistance of rubber and other elastomers, up to 500 lbs., in accordance with ASTM and ISO Specifications. Because the total test area is enclosed, Scott Model L-8 makes use of full clamp separation for greater convenience and usefulness.

Essentially three units in one, the new Model L-8 features (1) a compact conditioning cabinet using dry ice with a suitable solvent for low temperature testing, and all-electric heat controls for high temperature testing, (2) a fully enclosed, insulated test chamber with access ports for positioning of specimens, and (3) Scott's modern ACCR-O-METER electronic weighing system with console control panel, load cell, and strip chart recorder which "picturizes" test results in easy to read form. Pipping controls, stretch follower, and other test accessories are also included, as required.

Write today for complete facts on the Scott Model L-8 High-Low Temperature Environmental Tester — for tensiles to 500# (also available Model J-58 for tensiles to 2000# over same temp. range). Scott Testers, Inc., 85 Blackstone St., Providence, R. I. Tel. DExter 1-5650 (Area Code 401).

SCOTT TESTERS

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Seven Rubber Companies Listed In *Fortune* 500 Directory

TABLE I—THE INDUSTRY MEDIANS[1]

	Rubber	All Industry[2]
Sales (%)	—0.1	3.6
Profits (%)	—14.0	—10.5
Return on Invested Capital (%)	10.4	9.1
Return on sales (%)	3.7	4.4
Assets per employee ($)	10,791	15,511
Sales per employee ($)	17,118	20,835
Sales per $ of invested capital	2.68	1.98

(1) Includes only companies in the *Fortune* directory. (2) Industries are based on classifications established by the U.S. Bureau of the Budget.

► Seven rubber companies were listed in the *Fortune* magazine (July, 1961) directory of the 500 largest U. S. industrial corporations in 1960. The companies, Goodyear, Firestone, U. S. Rubber, Goodrich, General Tire, Armstrong Rubber, and Dayco, showed an average sales decrease of 0.1 per cent from 1959, compared with a 3.6 per cent increase for all industry. As shown in Table I, the rubber industry, represented by the seven firms, had an average profit decrease of 14 per cent from 1959, compared with an industry decrease of 10.5 per cent. However, in other quarters, the rubber industry fared better than all industry.

Table II shows the financial ranking of the seven rubber companies. Three of the firms are in the top 50 and five are in the top 100. The rubber industry leader is Goodyear, 23rd in the national ranking. Armstrong Rubber made the best advance in national rank, moving from 391 in 1959 to 352 in 1960. Dayco showed the biggest decline, dropping to 393 ranking in 1960 from 382 in 1959.

Enjay EPR Developed

► A new ethylene-propylene synthetic rubber, designated Enjay EPR, is being offered in commercial quantities by the Enjay Chemical Co., New York, N. Y. According to the company, the new synthetic rubber possesses outstanding resistance to ozone, weathering, and chemicals, and is expected to attract strong interest in the electrical and other industries. Enjay EPR is made by co-reacting two gases, ethylene and propylene, following a process developed by Esso Research & Engineering Co., an Enjay research affiliate. The process uses polymerization catalysts licensed from Professor Karl Ziegler in Germany. The new rubber is being produced at Enjay's plant in Baton Rouge, La.

Buys Industrial Rubber

► Ball Brothers Co. Inc., Muncie, Ind., has purchased the land, buildings, and equipment of Industrial Rubber Goods Co., St. Joseph, Mich. The three plants of Industrial, two at St. Joseph and one at New Troy, Mich., will continue to operate without interruption and without change in operating policies or management personnel. The three units will be known as the Industrial Rubber Goods Division of Ball Brothers Co.

TABLE II—FINANCIAL RANKING OF RUBBER COMPANIES IN U.S., 1960[1]

	Goodyear	Firestone	U. S. Rubber	Goodrich	General	Armstrong	Dayco
Sales ($000)	1,550,941	1,207,248	966,833	764,736	753,948	116,784	99,252
1960 Rank	23	30	43	57	58	352	393
1959 Rank	21	30	43	50	64	391	382
Assets ($000)	1,037,020	850,403	645,016	613,063	386,333	91,136	71,936
1960 Rank	28	42	58	61	102	340	405
1959 Rank	28	39	57	66	106	433	404
Net Profit ($000)	71,023	65,029	30,737	30,021	22,785	4,961	—5,969
1960 Rank	26	30	79	81	110	326	489
1959 Rank	25	27	66	64	99	359	445
Invested Capital ($000)	604,331	572,773	326,140	387,955	162,132	41,711	21,472
1960 Rank	33	36	76	64	141	417	482
1959 Rank	33	34	75	62	147	454	467
Employees[2]	95,760	82,392[3]	59,983	39,497	41,794	3,693	5,500
1960 Rank	14	19	26	50	44	442	359
Profit as % of Sales	4.6	5.4	3.2	3.9	3.0	4.3	—
1960 Rank	235	190	329	281	343	255	—
1959 Rank	255	216	332	253	316	239	412
Profit as % of Invested Capital	11.8	11.4	9.4	7.7	14.1	11.9	—
1960 Rank	140	154	241	303	85	131	—
1959 Rank	130	181	204	264	47	69	300

(1) Includes only companies listed by *Fortune* (July, 1961) in its directory of the 500 largest U.S. industrial corporations. (2) Average employment for year. (3) Employees at year's end.

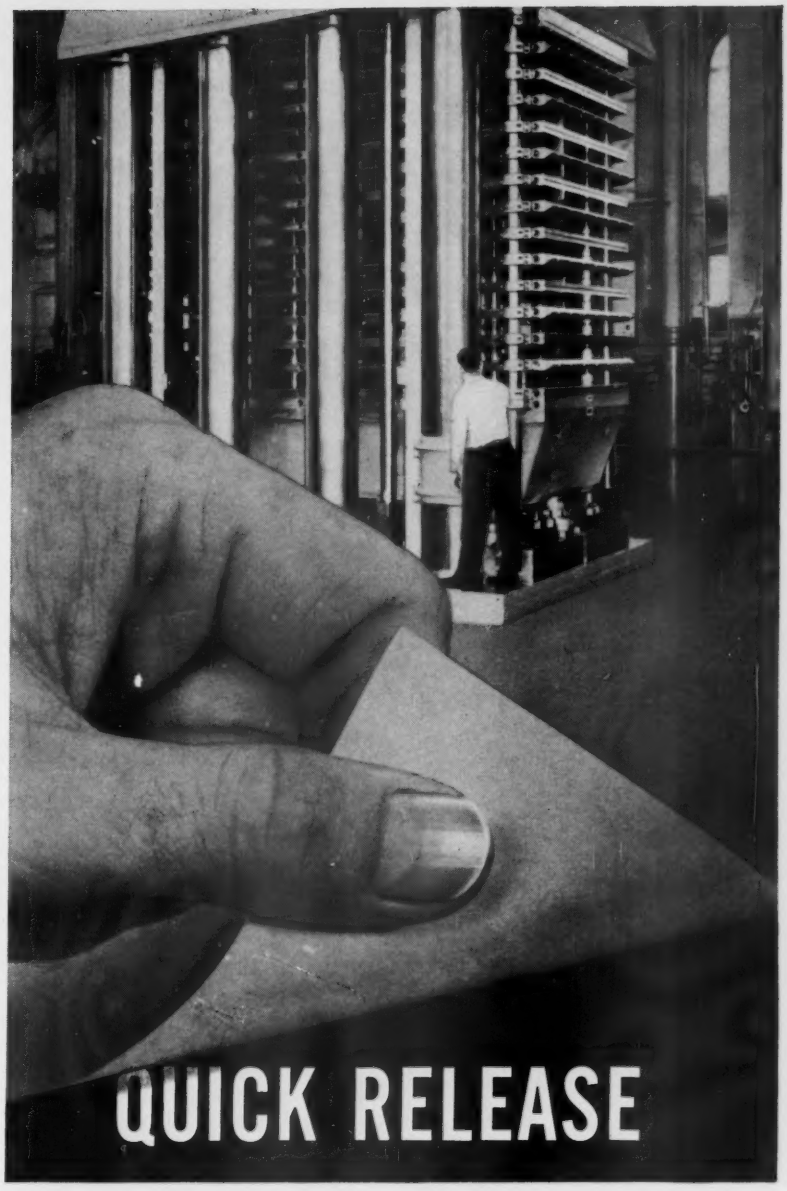
P. A. Fodor, Jr.

Named Sales Director

► Paul A. Fodor, Jr., has been appointed director of sales for the Chemical Division of the Pittsburgh Plate Glass Co., Pittsburgh, Penna. Mr. Fodor, formerly assistant director of sales, succeeds W. F. Newton, who recently was appointed director, marketing planning for the company's Merchandising Division. A graduate of Ohio State University, Mr. Fodor has been associated with the company's Chemical Division (formerly Columbia-Southern Chemical Corp., a Pittsburgh Plate subsidiary) since joining the Barberton, Ohio, plant as a development engineer in 1940. He also served as production engineer both at Barberton and at Bartlett, Calif., prior to his transfer in 1947 to the Chemical Division's Research and Development Department in Pittsburgh. He was appointed district sales manager at Philadelphia, Penna., in 1952, and four years later returned to Pittsburgh to serve as assistant director of sales.

Glidden Names DeChellis

► Glidden Co., Cleveland, Ohio, has appointed Louis J. DeChellis as a sales representative in the Texas territory of the Pigments and Color Department of its Chemicals Group. He will be responsible for developing sales of Glidden titanium dioxide, lithopone color ingredients, and copper pigments in the entire state of Texas. A 1949 graduate of the University of Notre Dame, Mr. DeChellis has spent the past 10 years in the field of paint chemistry, and since 1955 he has served as chief chemist for a large Southwestern paint manufacturer.



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Air-inflatable gymnasium, made of Airmat, a rubberized fabric material, is loaded aboard the *USS Theodore Roosevelt*, a submarine which carries the Polaris missile.

Crewmen receive their daily workout in the inflatable gymnasium ordered by the vessel's commander. "Air-walls" eliminate injuries from the submarine's steel structures.

Sub Carries Rubber Gym

► An air-inflatable rubber gymnasium is being carried on the *USS Theodore Roosevelt*, a nuclear-powered submarine with a captain who believes in exercise for his crew. The gym, built by the Goodyear Tire & Rubber Co., Akron, Ohio, joins the inflatable bunks and an inflatable gangplank on the ship, which carries the Polaris missile. Built to fit the only available space on the submarine—the passageway of the torpedo room — the structure measures 4 feet wide and 22 feet long when inflated. It can be installed in 30 minutes by 3 men, and deflated and stored when not in use. Five to ten pounds of air pressure per square inch are required to inflate the gym, which is built in two sections, joined by steel rods after inflation. It accommodates a punching bag, rowing machine, weights and similar athletic gear.

Introduces Turnpike 100

► Pennsylvania Tire Co., Mansfield, Ohio, has introduced Turnpike 100, a replacement passenger car tire made with two SDN nylon plies, but reported to have a four-ply rating. The Turnpike 100 embodies a new Pennsylvania SDN cord body construction process, a scientifically homogenized T-100 rubber compound, special safety beads, and a new "soft-ride" tread. The company states that the tire is as strong as standard four-ply nylon tires, but has a longer life-span, since it runs cooler and hence does not degenerate through heat build-up. The five-rib Turnpike 100 features a wide, flat, full depth tread said to prevent slide slippage and to assure silent running and good traction on the straightaway and in cornering.

DuPont Names Bolmeyer

► James W. Bolmeyer has been named manager of rubber industry marketing for the Textile Fibers Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. He will be in charge of the regional office in New York City, succeeding Howard P. Brokaw, who has been named director of industrial marketing services in Wilmington. Mr. Bolmeyer is a chemical engineering graduate of Case Institute of Technology. He joined DuPont after receiving his M.A. degree in 1948, and has been associated with technical and customer service operations. Most recently he has been connected with the technical service activities of DuPont fibers in a number of supervisory and managerial capacities.

UCC Integrates Research

► Union Carbide Chemicals Co. has formed a Research and Development Department at its technical center in South Charleston, West Va. The company states that the new department was established in recognition of the role which the development of new products and new technologies will play in the growth of the company. Three directors for the new department have been appointed: Franklin Johnston, director research and development — special projects; John W. Biddle, director research and development—polymer chemistry; Benjamin Phillips, director research and development — organic chemistry. Lawrence W. Newton has been named assistant to the vice-president, research and development. Under the new organization, each director will be responsible for development of new products, new use technology and new processes and the improvement of existing processes in his assigned area.

Dr. Johnston is a graduate of the University of Missouri and holder of a Ph.D. degree from Pennsylvania State University. He joined Union Carbide in 1933 and, prior to his new assignment, served as director of research. Mr. Biddle is a graduate of Columbia University with degrees of B.S. and M.S. in chemical engineering. He has been with the company since 1937 and was formerly development director.

Dr. Phillips received his B.S. degree from the University of the South and his Ph.D. degree from Johns Hopkins University. He has been active in research at Union Carbide since 1941, and previously served as associate director of research. Dr. Newton was graduated from the University of Wichita and received his Ph.D. degree from Harvard University. He has been associated with research at Union Carbide since 1941, initially at South Charleston and more recently in New York, where he has been serving as assistant to the vice-president —research and development.

Goodrich Trailer Tire

► A new boat trailer tire designed for high-speed turnpike driving as well as rocky shore terrain has been developed by the B. F. Goodrich Tire Co., Akron, Ohio. Called the Silvertown Traveler, the boat-trailer tire is wider and has a tread 39 per cent deeper than its predecessors.

Ted Chiles

Named Branch Manager

► Deering Milliken, Inc., New York, N. Y., has appointed Ted Chiles as manager of the new Akron, Ohio branch office of its Tire Cord and Industrial Synthetic Fabrics Division. Mr. Chiles was formerly associated with Callaway Mills, Inc. The company states that the Akron office, to be located at 9 Overwood Road, is being opened to provide better service to the rubber and other industrial accounts in that area. The company also announced the transfer of James W. Furr from the New York office to the new Akron branch, and that Charles M. Colhard, formerly in the Filament and Spun Synthetic Fabrics Division, has joined the New York sales staff of the Tire Cord and Industrial Fabrics Division.

Forms Marketing Group

► B. F. Goodrich Co., Akron, Ohio, has consolidated the marketing responsibilities of various divisions into a new industrial products marketing organization. James C. Richards, formerly vice-president for sales of the Industrial Products Division, heads the new organization as vice-president for marketing, industrial products. The new marketing organization will have responsibility for such products as conveyor and transmission belting, hose, molded and extruded rubber and plastic products, and vinyl pipe and sheeting manufactured by the company's Industrial Products Division. Additional responsibilities transferred from other divisions include industrial footwear, automotive and industrial cellular materials. Mr. Richards, who joined Goodrich in 1934, was vice-president for sales of the B. F. Goodrich Chemical Co. from 1952 to 1958, when he was appointed to his post in the Industrial Products Division.

Generally, there are three approaches by a company to the selection of a process dryer — the engineering, the economic, and the important evaluation of the intangibles. We firmly believe that SARGENT will always be found on top from every approach, for many reasons, an important one being that our machines and our people consistently deliver as promised, and more. This is the SARGENT:

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- Exclusive features for efficiency and safety.
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- A dryer designed for quick, easy cleanout.
- The bonus economy of the speediest, easiest installation of any machine on the market.
- Built by a company whose dryers lead the field — a company whose long experience makes a guarantee really mean something — a company that will say, "We stand unequivocally behind every machine we build."

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SARGENT Single-Pass, Two-Stage Rubber Dryer

This 32-section, 2-stage master batch dryer, delivering large tonnage hourly, has a vibrating feeder, an extra-wide conveyor. Gas-fired, with each of six zones separately heated, regulated and controlled. No air recirculation through the heaters prevents contamination. Full-height hinged doors for ease of speedy, thorough cleanout. Completely automatic push-button operation and control. It meets fully the exacting, specified requirements of hourly production with complete automation, operating efficiency and the incorporation of every known safety device for the protection of personnel, machine and stock.

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Akron Rubber Group scholarships, provided for students majoring in chemistry at the University of Akron, have been won by, seated left to right, John Coleman (senior), Milan Konstantinovich (freshman), and Deborah Bittaker (junior). Not in photograph is Jerry Kaye (sophomore). Standing, left to right, are Milton H. Leonard (Columbian Carbon), chairman of the Scholarship and Education Committee of the Akron Rubber Group, and Irvin J. Sjothun (Firestone), chairman of the Akron Rubber Group.

Chamberlain Buys Plant

► Chamberlain Engineering Corp., Akron, Ohio, has purchased the former Bridgewater Machine Co. plant in Akron. The 84,000 square-foot building will house Chamberlain's plastic operations, now located in Ravenna, Ohio, as well as departments of several affiliated companies. The company notes that the acquisition will permit enlarging the Colonial Rubber Division, which shared the facilities in Ravenna. Purchase price of the two buildings and 8.62 acres of land was not disclosed by the company.

Offers Window Gasketing

► Goodyear Tire & Rubber Co., Akron, Ohio, has entered the field of architectural window gasketing. Its Industrial Products Division will produce the rubber gasketing to suit varying glass thicknesses and wall types. Designs will include integral or separate lock strips to provide positive seal at both glass surfaces, and injection molding of corners will be offered to eliminate mitering, a source of air and water penetration in window installations.

Allied Names Three

► Allied Chemical Corp., New York, N. Y., has made three key research appointments in its General Chemical Division. William C. Ruch has been named director of development research; Dr. Robert W. Mason, director of laboratory research; and Charles D. Boyer, Jr., director of planning research. All were formerly assistant directors of their respective departments, and they are headquartered at the firm's General Chemical Research Laboratory in Morris Township, N. J.

Borden Offers PVC Film

► Resinite VF-70, a new polyvinyl chloride packaging film, is being produced by the Borden Chemical Co. at its North Andover, Mass., plant. Special properties claimed for the film are brilliant surface, unusual clarity, non-fogging, and excellent heat sealability. Chief application for the film is in packaging fresh fruit and vegetables, as well as other food items at the retail level. The company states that Resinite VF-70 is consistent with current government regulations for food applications.

Files Antitrust Suit

► The Justice Department has filed a civil anti-trust suit against four chemical manufacturers, charging them with fixing prices, rigging bids and allocating markets for carbon dioxide. The government action, filed in Federal Court, Brooklyn, N. Y., cited General Dynamics Corp., Groton, Conn., Olin Mathieson Chemical Corp., Baltimore, Md., Air Reduction Co., New York, N. Y., and Chemetron Corp., Chicago, Ill., as defendants, and named eight other firms as co-conspirators. The action charged that government agencies "have been prevented from receiving competitive bids and have been forced to pay artificially fixed prices for carbon dioxide." The gas, which solidifies under pressure into dry ice, is an important ingredient in rocket fuels and in other important industrial applications, including the rubber industry. The suit declared that the four companies sell $70 million of carbon dioxide annually, more than 80 per cent of the carbon dioxide sold in this country.

The government's action is being pressed in the wake of a criminal contempt case brought against the same firms last December. A Justice Department spokesman described the criminal charges—in which the court can impose unlimited fines and jail sentences—as "punitive." The new civil suit, he declared, was "preventive." In the civil suit, the government asks the court to enjoin the carbon dioxide producers from "allocating business, fixing prices, rigging bids, suppressing commerce, and exchanging information, bids, prices, terms or conditions." It also asks the court to order the four firms to withdraw their present price schedules and to come up with a new price list within sixty days.

The companies and four of their high-ranking officials have pleaded not guilty to the criminal charges. The criminal trial is being held before Federal Judge Jacob Mishler.

► A booklet describing Retarder E-S-E-N, a general purpose anti-scorch, and Retarder-J, for use with super abrasion furnace blacks, is available from Naugatuck Chemical, Naugatuck, Conn.

An index to Volume 89 of RUBBER AGE will be found on pages 185 to 188 of this issue.

B. D. LaGrone

Named Laboratory Head

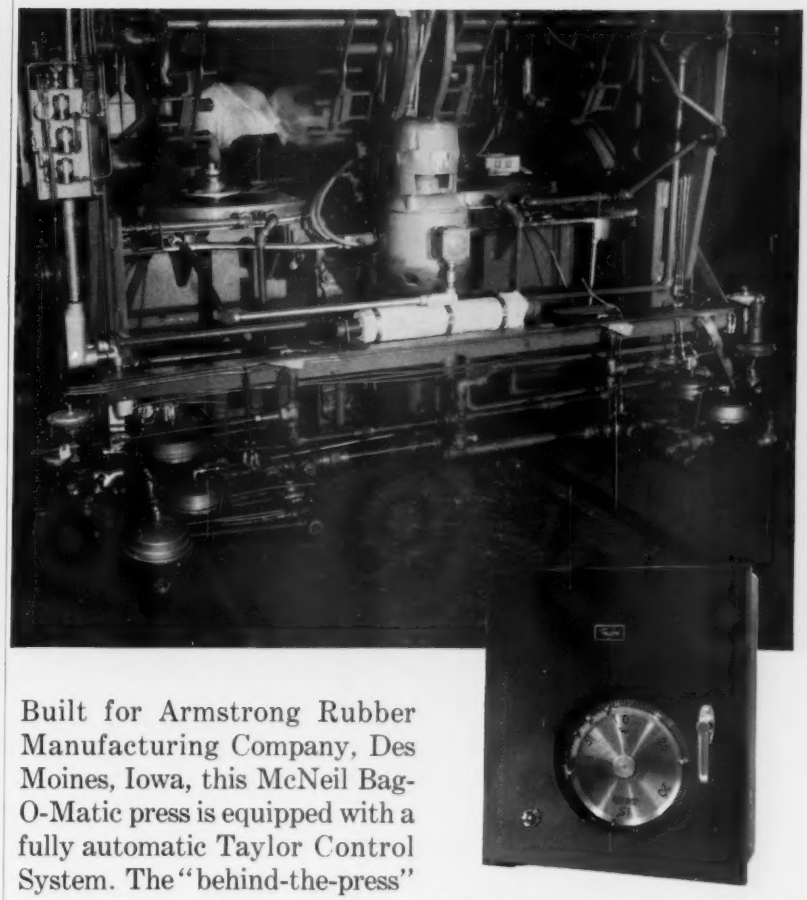
► Thermatomic Carbon Co., New York, N. Y., has appointed B. D. LaGrone as laboratory director of the facility adjacent to its plant at Sterlington, La. Mr. LaGrone graduated from Centenary College of Louisiana with a B.S. degree in chemistry, following which he accepted a teaching fellowship at the University of Texas. Prior to his present appointment, he served as senior compounder for Armstrong Tire & Rubber Co. at its Natchez, Miss., plant.

1962 Plastics Congress

► An international congress, having "Plastics and Problems of Choice" as its theme, will be held in Amsterdam, Holland, on October 15, 16, and 17, 1962. The congress will precede the Third International Plastics Exhibition "MacroPlastic," which is scheduled for Utrecht from October 18 to 25. The Amsterdam congress will deal with subjects relating to the various problems of choice in the field of plastics, with strong emphasis on economic as well as technical considerations. It will be broken up into four main sections, dealing with: (1) choice of material; (2) choice of processing technique; (3) choice of machines and tools; and (4) choice as to the degree of mechanization, or automation.

► Technical Bulletin No. 424, a 26-page folder entitled "New Plastolein Polymeric Plasticizers," describing Plastolein 9722, 9730, 9750 and 9765, is available from the Organic Chemical Division of Emery Industries, Inc., Cincinnati, Ohio.

TAYLOR CONTROLS
PRESSING PROBLEMS
AT ARMSTRONG RUBBER

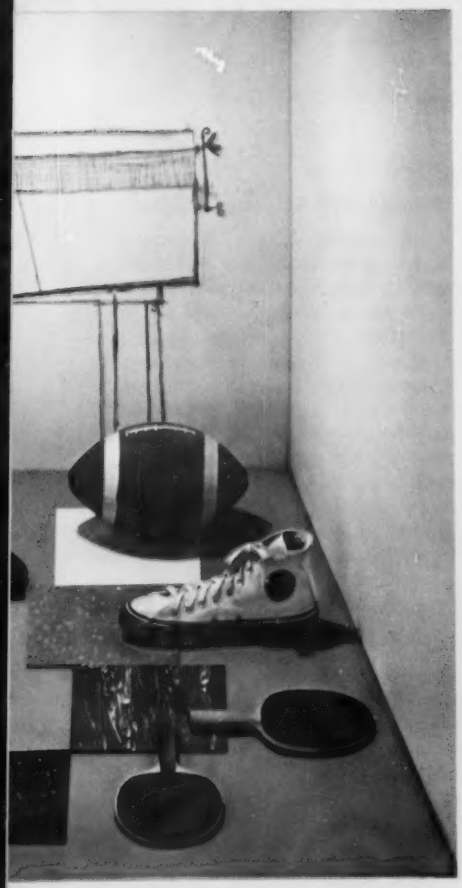


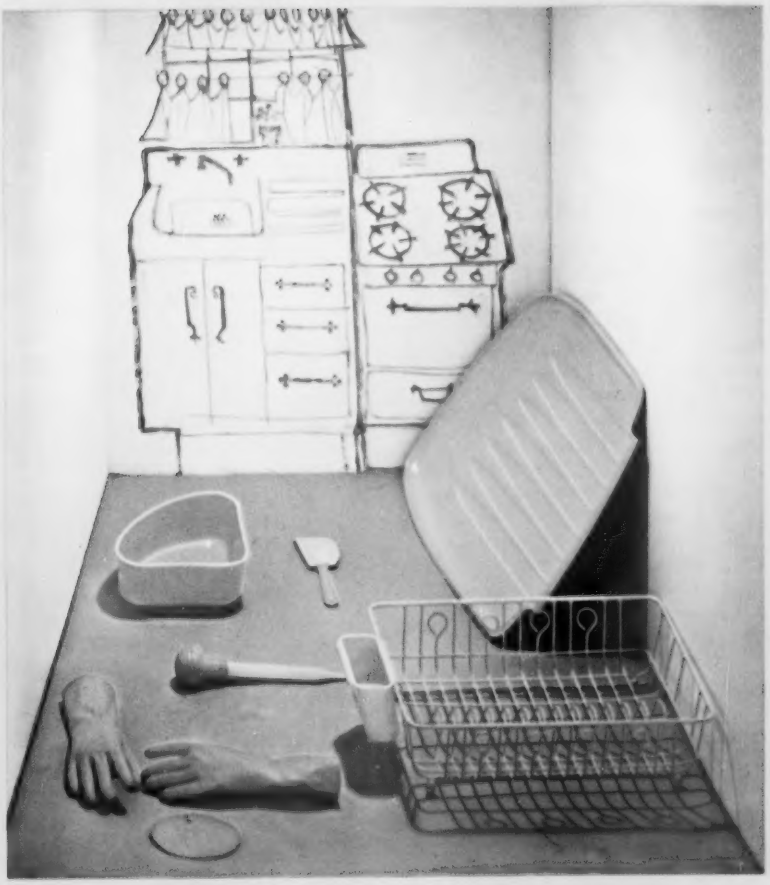
Built for Armstrong Rubber Manufacturing Company, Des Moines, Iowa, this McNeil Bag-O-Matic press is equipped with a fully automatic Taylor Control System. The "behind-the-press" picture, above, shows six Taylor 1078V Series Piston-Actuated Valves and one 1000V Series Valve with exclusive reversible actuator. These 1078V valves, designed for hot and cold service to 400° F., are sequenced by a Taylor FLEX-O-TIMER® Timed Program Controller.

The FLEX-O-TIMER Controller (inset photo) is the ideal instrument for completely automatic time control of tire or platen presses. It handles with complete accuracy, up to twelve pneumatic and/or electric functions with extremely short time intervals between steps. When you are expanding or modernizing, be sure to specify "Taylor equipped as usual". Write for Bulletins — 98373 on FLEX-O-TIMER Controls and 98417 and 98419 on valves. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Ontario.

Taylor Instruments **MEAN ACCURACY FIRST**

HI-SIL®, SILENE® & CALCENE® OPEN NEW PROFIT DOORS WITH COLOR





From kitchen to gameroom and out to the garage, your rubber goods . . . touched by color's sales magic . . . stand a better chance of winning the battle for consumer choice.

And Hi-Sil, Silene and Calcene, the *white* reinforcing pigments make color practical. Your designers have full command over the palette . . . from the excitement of bright hues to subdued pastel moods . . . from new transparent effects to this year's rich, deep tones.

Best of all, there's no sacrifice of physical properties with Columbia-Southern white reinforcing pigments. A full range of physicals is possible with straight or combination loadings of Hi-Sil, Silene and Calcene.

Our rubber specialists will be happy to help you tag *your* brand with color or upgrade properties on present color lines. Just call our district office nearest you.

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J. E. Wilson

Named by Erie Foundry

► J. E. Wilson has been named general sales manager of the Erie Foundry Co., Erie, Penna. In his new position, Mr. Wilson will direct domestic and international sales efforts for all Erie Foundry products, including steam and board drop hammers, mechanical forging presses for forge shop operations, and hydraulic presses for the forming of rubber, plastic, metal and other materials. Mr. Wilson is a 1940 graduate of the University of Notre Dame, where he earned his B.S. degree in electrical engineering. He joins Erie Foundry following service in domestic locomotive sales with the General Electric Co., Erie. He was transferred to Erie Foundry by GE in 1946, and has remained there since that time.

Cabot Buys Pigment Firm

► Cabot Corp., Boston, Mass., has signed a purchase-sale agreement with Acheson Industries, Inc., Port Huron, Mich., under which Cabot will acquire the business and manufacturing facilities of the Acheson Dispersed Pigments Co., Philadelphia, Penna., a wholly owned subsidiary of Acheson Industries. The agreement includes the pigment firm's subsidiaries and affiliates in Orange, Tex., Xenia, Ohio, and Dukinfield, Cheshire, England. Cabot will operate the Philadelphia, Orange, and Xenia plants as part of a new division, to be known as the Acheson Dispersed Pigments Division of Cabot Corp. The Dukinfield plant will be operated as part of the Acheson Dispersed Pigments Division of Cabot Carbon Ltd., Stanlow, Ellesmere Port, Cheshire, England.

Sid Richardson Ads Win Award

► An advertising series of the Sid Richardson Carbon Co., Fort Worth, Texas, published in RUBBER AGE, has recently won an international award from the Affiliated Advertising Agencies Network. The ad series, consisting of full page, two-color advertisements in RUBBER AGE during the past year, won in competition conducted during the AAAN annual meeting in Chicago, Ill. The winning ad series alternately emphasized Sid Richardson Carbon as being the world's largest producer of channel blacks, and reported on the construction of the firm's new furnace black plant in Big Spring, Texas, which recently was completed. Copy and headlines were tied in with silhouettes of western scenes. Sid Richardson's winning series of advertisements was produced by the Thomas L. Yates Advertising Agency of Fort Worth, Texas.

Marmix 16123 Latex

► The Latex and Coatings Department of the Marbon Chemical Division of Borg-Warner Corp., Washington, West Va., has developed a new latex designed to improve both physical properties and performance in products compounded from natural and synthetic rubber latices. Called Marmix 16123, the new product is a high styrene terpolymer reinforcing latex which can be blended with other rubber and resin latices to provide improved base compounds. Compatible with natural rubber, butadiene-styrene-nitrile, and neoprene latices, the new latex is said to thicken easily, improve color stability, lower process temperature requirement, and offer both stiffening and improved tensile advantages. The new modifier is also said to have a relatively low flux or fusion temperature, providing a margin of safety for plant processing.

► The Elastomer Chemicals Department of DuPont, Wilmington, Del. has released bulletin BL-371 called "Du Pont Chemicals in Polyisoprene Rubber".

An index to Volume 89 of RUBBER AGE will be found on pages 185 to 188 of this issue.

J. D. Harper

In Baker Sales Post

► Baker Castor Oil Co., Bayonne, N. J., has named John D. Harper as a field representative in its Western Sales Division. Assigned to Baker's Los Angeles district sales office, Mr. Harper will service the rubber, plastics, paint, resin, and chemicals industries in the Southern California area. Mr. Harper, a graduate of the University of Rochester with a B.S. degree in chemical engineering, had been employed as a sales representative with several chemical producers prior to joining Baker.

Burton Adds to Line

► Burton Rubber Processing, Inc., Burton, Ohio, is marketing a new line of Banbury-mixed synthetic rubber masterbatches. Fifteen compositions are available, including black and non-black reinforcing fillers incorporated in neoprene, nitrile, Hypalon and butyl rubbers. The company states that these products are guaranteed to a specific hardness and minimum tensile strength when tested in Burton Rubber's test formulas. The new group of masterbatches is suggested for use by firms that are currently mill-mixing loose carbon black or purchasing materials at LTL prices. The products are being marketed by the Beckham Co., Akron, Ohio.

Lead Stabilizer Developed

► A new lubricating stabilizer is available from Claremont Pigment Dispersion Corp., New York, N. Y. It is reported to eliminate the plating-out of aluminum pigments commonly encountered in calendering vinyl film and sheeting.

C. F. Blaich, Jr.

Named by Cyanamid

► Charles F. Blaich, Jr., has been appointed supervisor of the urethane technical service laboratory of the Rubber Chemicals Department of American Cyanamid Co., Bound Brook, N. J. Mr. Blaich is a graduate of Lebanon Valley College with a B.S. degree in chemistry. Prior to joining Cyanamid earlier this year, he was associated with the Carwin Chemical Co. as group leader for both technical and market development of urethane rubbers and adhesives. Mr. Blaich is a member of the Rubber Division of the American Chemical Society, the New York and Akron Rubber Groups, and the Society of Plastics Engineers.

Seiberling Closes Unit

► Seiberling Rubber Co., Akron, Ohio, closed its shoe products plant at Carey, Ohio, on September 15, and will concentrate its heels and soles operation at its new subsidiary plant in Batesville, Ark. Most of the Carey plant equipment will be moved to Batesville, and about 65 employees of the Carey facility will be receiving severance or retirement pay under terms of the union contract with the United Rubber Workers.

H. P. Schrank, who announced his intention to add emphasis to shoe products when he took office as president of Seiberling on August 28, said the confines of the small Carey plant "severely restricted" heels and soles production. The new chief executive added that production in the subsidiary, Batesville Rubber Co., in Arkansas, now starting, would enable the Shoe Products Division to develop southern and western markets. Seiberling has operated at Carey, on leased property, since 1944.

Neoprene and
synthetic rubber formulators:
Remember these facts
about
SEAMAG*
Neoprene Grade Magnesia!
SEAMAG is economical! It's available at an attractive price because it is made by an exclusive FMC process and backed by fully integrated production and long experience producing heavy magnesias.
SEAMAG is efficient! The right degree of activity makes it outstanding as an anti-scorch and curing agent and acid acceptor.
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MINERAL PRODUCTS DIVISION

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Financial News

Clevite

► First half: Earnings amounted to $2,423,739, equal to $1.24 per share, compared with $3,930,395 for the first half of 1960. Net sales were $46,700,745, against $51,409,665 for the comparable period a year ago.

Heyden Newport

► First half: Net income amounted to $1,238,000, equal to 60c per share, compared with $1,625,000 or 82c per share, for the first half of 1960. Net sales came to $30,277,000, against $30,851,000 for the corresponding period a year ago.

Hewitt-Robins

► First half: Net income came to $333,690, equal to 70c per share, compared with $310,910, or 73c per share, for the same period a year earlier. Net sales totaled $20,007,740, against $24,697,748 for the corresponding period in 1960.

Triangle Conduit & Cable

► First half: Net income was $145,377, equal to 10c per share, compared with $624,542, or 44c per share, for the first six months of 1960. Sales amounted to $25,772,426, against $25,908,350 for the corresponding period a year earlier.

Thiokol Chemical

► First half: Net income reached $2,242,755, equal to 48c per share, compared with $1,736,648, or 37c per share, for the first half of 1960. Net sales totaled $84,996,405, against $83,361,675 for the like period a year ago.

Seiberling Rubber

► First half: A net loss of $172,951 was recorded, compared with earnings of $106,592 for the comparable 1960 period. Sales amounted to $23,189,191, against $24,910,000 for the first six months of last year.

McNeil Machine

► First half: Net income was $1,781,408, equal to $1.31 per share, compared with $2,584,539, or $1.86 per share, for the like period a year ago.

Olin Mathieson

► First half: Net income amounted to $14,401,884, equal to $1.10 per share, compared with $18,665,887, or $1.40 per share for the first half of 1960. Sales came to $349,729,566, against $348,281,172 for the same period a year earlier.

Interchemical

► First half: Net income amounted to $2,205,000, equal to 97c per share, compared with $3,261,000, or $1.53 per share for the first six months of 1960. Net sales reached $65,187,000, against $64,756,000 for the comparable period a year ago.

General Cable

► First half: Net income was $3,060,316, equal to $1.07 per share, compared with $4,602,769, or $1.43 per share, for the first half of 1960. Net sales amounted to $13,047,307, against $16,486,980 for the similar period a year ago.

DuPont

► Three months ended June 30: Earnings were $101,316,002, equal to $2.15 per share, compared with $103,956,482, or $2.22 for the second quarter of 1960. Net sales totaled $570,744,606, against $568,650,195 for the like period last year.

Cooper Tire

► First half: Net income totaled $450,877, equal to 52c per share, compared with $216,822, or 25c per share, for the comparable period a year earlier. Net sales totaled $18,880,117, against $18,477,303 for the first half of 1960.

United Carbon

► First half: Net income came to $3,293,176, equal to $2.51 per share, compared with $3,634,055, or $2.85 per share, for the corresponding period a year ago. Sales amounted to $27,366,350, against $28,644,455 for the first half of 1960.

Midland-Ross

► First half: Net income amounted to $2,146,653, equivalent to $1.24 per share of common stock. Net sales totaled $65,460,968.

Harshaw Chemical

► Nine months ended June 30: Net income reached $1,341,444, (after a special credit arising from dispositions of capital stocks), equal to $1.27 per share, compared with $1,293,095, or $1.22 per share, for the corresponding period ended 1960. Net sales came to $51,329,656, against $55,541,379 for the same fiscal period a year earlier.

Sheller Mfg.

► First half: Net income was $305,144, equal to 32c per share, compared with $940,229, or 99c per share, for the first half of 1960. Sales amounted to $18,575,614, against $26,096,081 for the comparable six-month period a year ago.

Koppers

► First half: Net income was $2,757,000, equal to $1.07 per share, compared with $4,220,000, or $1.71, for the corresponding period a year ago. Net sales amounted to $129,000,000, against $147,700,000 for the first half of 1960.

Simplex Wire

► First half: A net loss of $91,000 was recorded, compared with $497,000, equal to 83c per share, for the first six months of 1960. Net sales totaled $15,190,000, against $18,381,000 for the like period a year ago.

Nopco Chemical

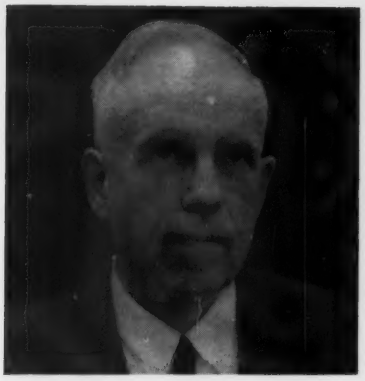
► First half: Net income was $849,415, equal to 76c per share, compared with $926,169, or 84c per share, for the first six months of 1960. Net sales totaled $23,146,451, against $20,492,705 for the comparable period a year ago.

U.S. Rubber Reclaiming

► First half: Net income was $95,226, equal to 21c per share, compared with $298,254, or 67c per share, for the comparable period a year ago. Net sales reached $2,605,836, against $3,947,020 for the first half of 1960.

Lamb Industries

► First half: Net income was $79,096, equal to 7c per share, compared with $247,369, or 23c per share, for the first half of 1960. Sales totaled $8,778,054, against $8,377,980 for the comparable period a year ago.



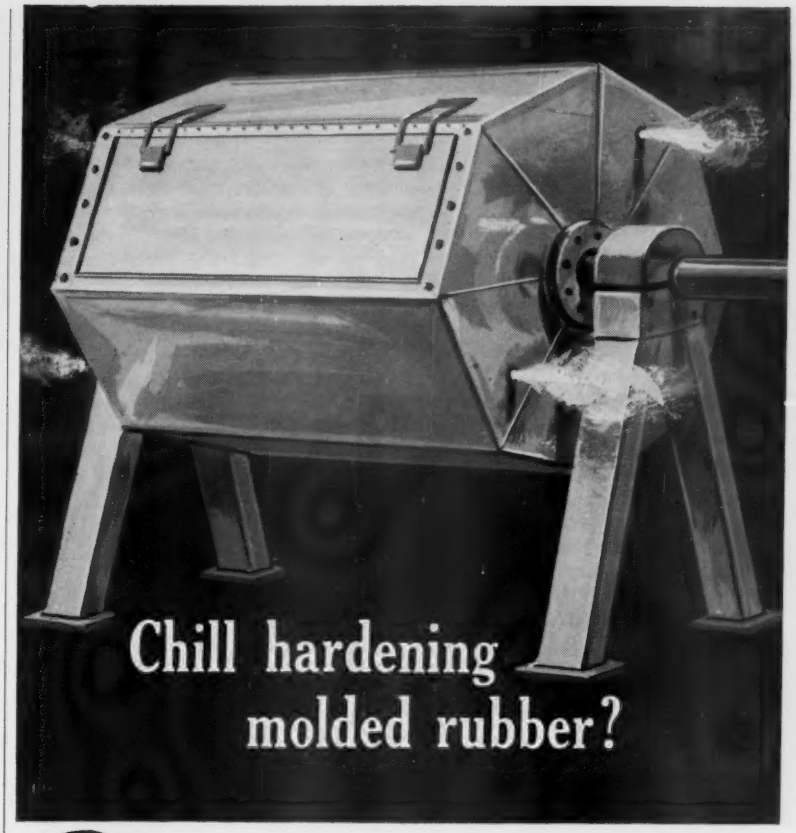
D. E. Cable

Retires from U.S. Rubber

► Donald E. Cable, research scientist at the U. S. Rubber Co., New York, N. Y., has retired after 31 years of service with the company. A graduate of Armour Institute of Technology with a B.S. degree in chemical engineering, Dr. Cable also holds an M.S. degree in chemistry from the University of Wisconsin, received in 1920, a Ph.D. degree in chemical engineering from Columbia University, received in 1925, and a chemical engineering degree from Armour Institute of Technology, received in 1927. Upon graduating from Armour Institute in 1918, Dr. Cable spent the next four years as assistant chemist and assistant engineer in the U. S. Forest Products Laboratory, Department of Agriculture, and in the Wyoming Agricultural Experiment Station at Laramie where he served as assistant research chemist.

After serving six years as assistant director of the Research Department at the Oxford Paper Co., he joined U. S. Rubber in 1930 at the Wayne, N. J. Research Center as assistant to the general manager, with responsibility for development work on rubber-fiber products. From 1934 to 1942, Dr. Cable was library supervisor at the company's General Laboratories in Passaic, N. J. He returned to the General Laboratories after serving three and a half years in the military service, and was assigned to various experimental projects, including rubber tread compounding, Kralac-gum plastics compounding and aging studies, and UPBE tread stock compounding.

Dr. Cable is the holder of a number of patents on improvements in the making of reconstructed leather-rubber sheets, and (with Drs. Ladd, Szayna and Harvey) on vapor phase catalytic dehydrogenation of "transfer chemicals."



Heads it's liquid CO_2

tails it's dry ice!

Either way you win . . . since either form of Mathieson CO_2 in your tumbling barrel expedites the tumbling of molded rubber parts smoothly, efficiently, perfectly.

But there's two sides to the coin . . . and you stand to gain *more* if you choose the form of CO_2 most economical for your particular operation. If you're uncertain, why take a chance? Instead of flipping that coin, use it for a phone call to the Olin Mathieson man at the office nearest you. He's always available for consultation and he'll come armed with technical advice on the most economical use of Mathieson CO_2 for your operation.

For an informative booklet or additional information on CO_2, write Olin Mathieson, Baltimore 3, Maryland.

CHEMICALS DIVISION Olin

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West Coast News

► U.S. Rubber Co., New York, N.Y., has released a market survey indicating that buyers of premium tires in California are equally divided between two income groups: half are business, professional, farm and non-labor vehicle owners, while the other half are white collar and manual workers. The survey indicated that 89 per cent of premium tire buyers in California drive late model cars, and that most of the premium tire sales in the state are made as replacements for extensively used tires, rather than as changeovers on new cars. The study also revealed that 66 per cent of the premium tire buyers drive from 10,000 to 25,000 miles per year, while 70 per cent drive more than 10,000 miles. This contrasts with an average of 8,200 miles for all drivers.

► Monsanto Chemical Co., Long Beach, Calif., has begun operations at its newly constructed phthalate ester plant, capable of producing about 51 million pounds per year. The liquid compounds are used widely as plasticizers to give flexibility to resins used in plastic products. The company also has increased its bulk storage and blending capacity for phthalate esters by 50 per cent, after having doubled its capacity last year. Monsanto reports that during the past five years, the volume of vinyl plastic processing in the Los Angeles area has tripled, growing at a rate about four times its national average. The company predicted that vinyl plastic processing may double its volume during the next five years.

► R. D. Abbott Co. has moved its offices to 5268 Alhambra Avenue, Los Angeles, Calif. The new quarters are in the vicinity of the former facilities, but closer to the downtown area of Los Angeles. According to Carl Hoglund, president of R. D. Abbott, the company will now be in a position to warehouse greater stocks of adhesives, colors, plasticizers, peptizers and reclaim oils, liners, cork, and antiozonants, as well as crude rubber, carbon blacks, sulfur, solvents, and miscellaneous small items.

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., which now produces 185,000 tons of titanium dioxide in the east, has initiated a study contemplating construction of a West Coast TiO_2 unit. The company is reported to have under "active consideration" a western unit to make titanium dioxide pigment by its new chloride process, which involves oxidation of titanium tetrachloride in place of the conventional sulfuric acid method. It uses either pure oxygen or oxygen-enriched air.

Another company planning to produce titanium dioxide on the West Coast is the American Potash & Chemical Corp., which has a unit under construction near Mojave, Calif. This unit will have technical assistance from LaPorte Titanium Division of LaPorte Industries, Ltd. Completion date and cost of construction have not been disclosed.

► Hugh Stewart has joined the staff of the Plastics Corp. of America as a rubber technologist and will be associated with the firm's recently-acquired West Coast subsidiary, Cole Rubber & Plastics Co., Palo Alto, Calif. During more than three decades in the rubber industry, Mr. Stewart was associated with the Rubber Development Department of the Western Electric Co., and held management and research positions at Garlock, Inc., Keasby and Mattison Co., Linear Packing & Rubber Co., Western Felt Works, and the National Motor Bearing Division of Federal Mogul Corp.

The company also announced that it is building a new plant at Santa Cruz, Calif., and will relocate the Cole organization at the new facilities when completed later this year.

► Plastics Corp. of America, Inc., one of a group of plastics producing concerns owned by Plastics Corp. of Minneapolis, has acquired all the outstanding stock of Cole Rubber and Plastics, Inc., Palo Alto, Calif. A new plant for the Cole company will be built in Santa Cruz, it was announced, and the company will become a source for highly engineered silicone and fluorocarbon products. Last year, Cole Rubber reported sales of $250,000.

Robert M. Simpson

Joins Ram Chemicals

► Robert M. Simpson has joined Ram Chemical Manufacturing Co., Gardena, Calif., as marketing and sales manager, a newly-created post. According to the company, Mr. Simpson will expand Ram sales nationally by building a strong field sales organization, appointing additional distributors throughout the United States, and developing a new and intensive advertising and promotion program to reach the ultimate user of Ram products. Mr. Simpson had been associated with the Columbia-Southern Chemical Corp., a division of the Pittsburgh Plate Glass Co., since 1944 in various sales and management capacities. He was manager of pigment sales when he resigned. Mr. Simpson holds a B.A. degree in chemistry from Cornell University and is a member of the Division of Rubber Chemistry of the American Chemical Society and the American Association for the Advancement of Science.

► Robert H. Wendt has been appointed executive vice-president and general manager of American Latex Products Corp., Hawthorne, Calif., a wholly-owned subsidiary of the Dayco Corp., Dayton, Ohio. He has also been appointed president of the Hardman Tool and Engineering Co., Los Angeles, Calif., another West Coast subsidiary of Dayco, having formerly served as its executive vice-president and general manager. Mr. Wendt succeeds C. M. Christie, who has resigned as president of Hardman as well as American Latex Products Corp.

McCreary Holds Meeting

► Officials of the McCreary Tire & Rubber Co. gathered recently at White Sulphur Springs Hotel, near Bedford, Penna., for a four-day review of management policies and a look at future planning and development. Forty key personnel attended. Among topics reviewed were the company's newly revamped quality control system; continued up-grading of techniques through the perfection of new methods and machinery; and a sales campaign heralding the new MC-70 passenger tires. Among the speakers was Dr. James Hayes, dean of the business school at Duquesne University, who discussed industry's need for long-range planning technical development, objectives, and employee motivation. His talk was correlated with a filmed lecture by Dr. J. M. Juran of the American Management Association.

Copolymer Expands Plant

► The butadiene plant of the Copolymer Rubber & Chemical Corp., Baton Rouge, La., has completed installation of the Dow catalyst process, a new method of producing butadiene. The Dow catalyst unit is part of a $5 million expansion program which included the addition of a steam boiler and turbogenerator, among other power plant additions needed to provide the new steam requirements. The company states that the installation of the new process has increased the capacity of its butadiene plant by approximately 50 per cent. Copolymer's rubber production is now rated at 133,000 long tons per year, compared with the plant's former rating of 95,000 long tons.

Westwood Names Cook

► Thomas E. Cook has been named vice-president of Westwood Chemical, Inc., Cleveland, Ohio. In his new assignment, Mr. Cook will handle sales and promotion to the rubber industry for Northo Chemical, a new producer of fat-based chemicals, and for the Tumpeer Chemical Co. He will be located in Akron, Ohio. Mr. Cook was formerly purchasing agent for the Synthetic Rubber Division of the Firestone Tire & Rubber Co., and most recently served with the S. S. Skelton Co. as Akron manager.

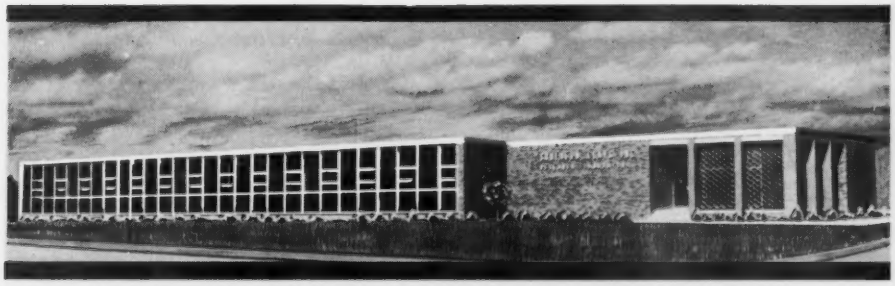
Develops Min-U-Sil Filler

► Pennsylvania Glass Sand Corp., Pittsburgh, Penna., is marketing a low-cost, inert, semi-reinforcing filler for silicone rubber. Called Min-U-Sil, the filler is reported to permit high loading, while its 99.9 per cent silicon dioxide content makes it chemically inert and extremely resistant to heat. According to the company, Min-U-Sil has no injurious effect on the silicone rubber system, and will not inhibit or otherwise disturb the peroxide vulcanizing catalysts.

In addition, since the new filler is pure white, it permits tighter color control of finished materials. Reportedly compatible with all colloidal silica fillers, Min-U-Sil is produced in four uniform micron-sized grades: 5, 10, 15 and 30, with particle-size distribution of each grade controlled to close tolerances.

► Kaykor Products Corp., Yardville, N. J., has available a brochure entitled "Kaykor Rigid Polyvinyl Chloride," Catalog RV-61, covering Kaykor Rigid PVC products, applications, fabrication procedures and physical properties.

OUR NEW RESEARCH LABORATORY



New research laboratory conveniently located at our plant in Gordon, Ga.

A symbol of better research and technical service to our customers

Many of today's well-known kaolin clay products have been developed by Southern Clays' research. We were the first to give you Calcined Clays such as Pigment #33, #34 and Whitetex. As cross link polyethylene and ethylene propylene co-polymers were introduced, we gave you the non-black, reinforcing filler, Translink.

Now, one of the latest steps in our growth is the opening of a new research laboratory with the most modern facilities and equipment available. Our staff will be working on new clay developments as well as offering technical assistance to our many customers in the rubber field.

Do you have a problem with clays? One of our products could be the answer . . . but we must first know the problem. Submit inquiry to our Technical Service Department.

SOUTHERN CLAYS, INC.

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Canadian News

► Polymer Corp., Sarnia, Ontario, has released its annual report for 1960, revealing that the firm has had the most successful year in its history, in terms of business volume and profit. Net income after taxes reached $9,850,000, a modest increase over the previous 1956 high of $9,450,000. This compares with 1959 earnings of $3,690,000. Net sales climbed to $85,915,000, while output of finished rubber also reached a new peak of 351,000,000 pounds. More than 70 per cent of this production went to export markets. The company noted that after payment of the regular dividend of $3,000,000, equal to $1.50 per share, the balance of earnings was retained for a heavy capital spending program planned for the next three years. Total investment in the Sarnia plant rose to slightly more than $100,000,000. In the annual report, E. Ralph Rowzee, president of Polymer Corp., stated that success in cutting production costs, as well as the approach of the Canadian dollar to parity and subsequently to below parity with U. S. money, contributed to the company's successful operations.

► Dr. Kenneth Guy Blaikie, senior scientist at Shawinigan Chemicals Ltd., Shawinigan, Quebec, is the 1961 recipient of the R. S. Jane Memorial Lecture Award, established last year by the Chemical Engineering Division of the Chemical Institute of Canada, in memory of the late Dr. Jane, a noted Canadian chemical industry executive. The award is presented to a resident of Canada for exceptional achievement in a field of chemical engineering or industrial chemistry. Dr. Blaikie will give the Jane Lecture at the Chemical Engineering Conference of the Institute, to be held in Toronto, Ontario, on November 6 to 8, 1961.

► Dr. Leo Marion, senior director of the National Research Council, Ottawa, Canada, has been elected president of the Chemical Institute of Canada. The CIC also elected Dr. Laurence H. Cragg, vice-president of the University of Alberta, vice-president of the Institute.

► Dunlop Canada, Ltd., Toronto, Ontario, has announced three new executive appointments. J. P. Anderson, C.B.E., formerly president of the firm, has been appointed chairman of the board, succeeding Sir G. Edward Beharrell, who remains as a director. G. F. Plummer, F.C.A., formerly executive vice-president, has been appointed president. W. McMillan, formerly sales manager of the Automotive Division for Canada, has been named regional manager for the Province of British Columbia.

Mr. Anderson came to Canada in 1952, and became president the following year. Mr. Plummer joined Dunlop Canada in 1940, was appointed Secretary-Treasurer in 1946 and then, successively, assistant to the director of production in the United Kingdom, vice-president of automotive sales, and executive vice-president. Mr. McMillan has held several key positions since joining the company at Winnipeg in 1937, including branch manager for British Columbia and, most recently, sales manager of the Automotive Division.

► Naugatuck Chemicals Division of the Dominion Rubber Co. has opened a new $1.4 million chemical plant at Edmonton, Alberta. The new facility produces pentachlorophenol, as well as herbicides 2,4-D, 2,4,5-T, and M.C.P.—the basic active ingredients used in volume by companies formulating pesticides. The company reports that the new facilities more than double its herbicide producing capacity, and that eventually they will be used to manufacture other products not currently being made in Canada. Dominion Tar & Chemical Co. has been appointed exclusive sales agent for Naugatuck's output of pentachlorophenol.

► David F. Catto has been appointed assistant comptroller of the Goodyear Tire & Rubber Co. of Canada Ltd., New Toronto, Ontario. In his new position, Mr. Catto will be responsible for the company's factory accounting operations. With Goodyear for 28 years, Mr. Catto has been manager of the General Accounting Department since 1939.

► Six personnel appointments have been announced by Cabot Carbon of Canada, Ltd., Sarnia, Ontario. Desmond G. Seymour has assumed the position of manager, technical service, with headquarters at Sarnia. William H. Ehman has transferred from the Production Department to the Technical Department as quality control supervisor to assist Mr. Seymour. William L. Leach, formerly in charge of the Montreal sales office, has been transferred to the Toronto sales office as assistant sales manager. Thomas Crooks has joined Cabot Carbon of Canada, and will take charge of the Montreal sales office. Edward L. Somers has joined the Toronto Sales Department. Alexander Jaychuk has been appointed process engineer in the Production Department.

► General Tire & Rubber Co. of Canada, Ltd., Welland, Ontario, will attempt to capture its share of the compact-size snow tire market with a complete line of 13-inch winter treads. The company reports that the introduction of domestic compact cars and imported models has created a potential market for more than 800,000 new snow tires in North America. According to General, there are few recappable casings of this size available for snow treads, and the bulk of sales will be new tires.

► A new passenger car tire, combining two plies of nylon cord fabric and two plies of high tenacity rayon, has been developed by the Seiberling Rubber Co. of Canada Ltd., Toronto, Ontario. Trademarked "Nytex," the passenger tire will be made and distributed in both Canada and the United States by Seiberling, Canada and by the parent Seiberling Rubber Co. of Akron, Ohio. A. L. McMullen, vice-president, production for the Canadian firm, was responsible for design and development of the tire.

► A ten per cent retail reduction in car tire prices has been announced by Goodyear Tire and Rubber Co. of Canada, Ltd., New Toronto, Ontario. The reduction applies to "certain types of passenger tires, pneumatic and solid truck tires, tractor tires, and garden and implement tires." In the popular car lines, this will mean savings of from $2.50 to $6.50.

Flexible Names Three

► Flexible Products Co., Marietta, Ga., has appointed Joe McCormick and Peter Blom as sales engineers and Martin Kovarik as product manager of urethane materials. The company also announced that it has expanded its operations to include vinyl solvent solution and emulsion systems, epoxy compounds and urethane components for coatings, elastomers, and foams. In addition, Flexible Equipment Corp., a subsidiary of Flexible Products, has been named exclusive distributor in the Southeast for the Plastics & Resin Equipment Division of Binks Manufacturing Co., Chicago, Ill. Flexible Products, celebrating its tenth anniversary, has recently completed a new plant in Marietta, which maintains complete laboratory facilities for research, development, and quality control, as well as for the demonstration of its products and equipment.

► Four new Escon polypropylene impact grades have been introduced by the Enjay Chemical Co., New York, N. Y. They are Escon 205, 215, 223, and 233.

Introduces All-Mark Ink

► Weber Marking Systems, Inc., Mount Prospect, Ill., has introduced a marking system designed for use in multiple marking on non-porous surfaces. A new ink, All-Mark Ink, has been formulated for use with specially designed hand printing devices that print from a stencil, permitting duplication of information on address and product identification labels that currently are marked individually by hand. According to the manufacturer, use of the All-Mark Ink in conjunction with a stencil and Weber handprinter permits information to be printed on rubber, plastics, glass, metal, cellophane, and other non-porous surfaces at a speed of 40 to 60 prints a minute. The ink is said to dry in a few seconds on many surfaces, enabling its use right on the production line. It is available in black and five colors: blue, green, red, orange and yellow.

► Manufacturers Chemical Co., Camden, N. J., is offering to manufacture tackifier resin emulsions to individual specifications as a new service, using strict quality control methods.

Purchase National Plastic

► Enjay Chemical Co., New York, N. Y., and J. P. Stevens & Co., Inc., New York, N. Y., have purchased the operating assets and facilities of the National Plastic Products Co., Odenton, Md. For this purpose, Enjay and Stevens have formed a new jointly-owned company, which will continue the National Plastic name and its present management. The new owners have been engaged for more than a year in a joint research project to develop the manufacture and utilization of textile fibers from polypropylene plastic. A jointly-owned pilot plant is in operation at Stevens' Garfield, N. J., research laboratory.

Goodyear Wire Tires

► Tires with millions of tiny pieces of built-in steel wire beneath the tread are being marketed by the Goodyear Tire & Rubber Co., Akron, Ohio, for such heavy-duty uses as mining, quarring, and road construction. The wire is contained in the undertread, a layer of rubber between the tread and the fabric body of a tire.

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Obituaries

Charles C. Gates

► Charles C. Gates, founder and president of the Gates Rubber Co., Denver, Colo., died on August 29 in his home of a heart attack. He was 83 years old. Mr. Gates founded the company in 1911, when he gambled $1,000, his entire savings, on a faltering leather goods business. Under his guidance, the firm grew into the nation's sixth largest manufacturer of rubber products.

Mr. Gates received a degree in mining engineering in 1904 from the Michigan College of Mines. For the next seven years he worked as a mining engineer for various firms in the West. In 1911, he settled in Denver and invested his small savings in a part payment for the Colorado Tire and Leather Co. The purchase price was $3,500. The concern was then producing the Durable Tread, a steel-studded band of elkhide that was fastened over the flimsy automobile tires of that era to give them longer life.

As the rubber tire improved, the Durable Tread became outmoded. The company later manufactured its products out of rubber. Subsequently, it became known as the International Rubber Co. and, in 1919, the Gates Rubber Co.

Mr. Gates leaves his widow, one son, four daughters, sixteen grandchildren, and his brother John, who has been secretary-treasurer of the company since its founding.

Rudolph D. Knapp

► Rudolph D. Knapp, factory manager and assistant treasurer of the Carter Bell Mfg. Co., Springfield, N. J., died on July 5 at the age of 64. Mr. Knapp had been associated with Carter Bell for 44 years, following a period of service in the U. S. Marine Corps during World War 1. He is survived by a son and a daughter.

John C. Grindlay

► John C. Grindlay, former general sales director for the Watson-Stillman Co., Roselle, N. J., died on August 1 at his home in Plainfield. He was 61 years old. Surviving are his widow, a son, a daughter, a brother and three sisters.

Ernest I. Kilcup

► Dr. Ernest I. Kilcup, president and board chairman of the Davol Rubber Co., Providence, R. I., died on June 10 at his home after a short illness. He was 70 years old. Dr. Kilcup attended Brown University and in his later years received several honorary degrees, including a doctorate of science from the Rhode Island College of Pharmacy, now a division of the University of Rhode Island. He joined Davol Rubber in 1918 as a clerk, and rose to become assistant secretary-treasurer in 1928, a director, secretary and acting treasurer in 1930, managing excutive in 1932 and president in 1937. Under his leadership, the company initiated and expanded many employee benefits, and was one of the first companies in Rhode Island to pay hospitalization premiums in full. During his business career, Dr. Kilcup taught economics, marketing, and financial management at Northeastern University and served as a trustee of Bryant College and a director of several banks, business concerns, and institutions. His survivors are his widow, a brother, and a sister.

William F. Ong

► William F. Ong, formerly manager of the Mechanical Goods Department of the Goodyear Tire & Rubber Co., died on August 18 in Hendersonville, N. C., while on vacation. Born in Ohio, he was a resident of Akron for 40 years. He was with the Seiberling Rubber Co., prior to joining Goodyear. Mr. Ong leaves his wife, two sons, a daughter, 11 grandchildren, and one great grandchild.

Charles Muehlstein

► Charles Muehlstein, retired vice-president and director of H. Muehlstein & Co., Inc., died on August 13. He was 73 years old. Mr. Muehlstein had been in charge of the Chicago, Ill., office of H. Muehlstein & Co., and retired in 1951. Mr. Muehlstein leaves his wife, a daughter, a son, two grandchildren, and his brother, Herman, founder and president of H. Muehlstein & Co.

A. S. Bishop

► A. S. Bishop, retired managing director and board chairman of Goodyear Tires Rubber Company (Great Britain, Ltd.) died on July 10 in Sussex, England, where he resided. He was 68 years old. Mr. Bishop joined Goodyear in 1916 as a clerk in the Solid Tire Department at Manchester. He became manager of solid tire sales in London in 1919, and came to the United States to learn about giant pneumatic rubber tires, which he introduced in England. He became assistant sales manager of Goodyear-Great Britain in 1922, and manager of commercial tires in 1926. In 1933, he was named general sales manager, in 1936 sales director, and in 1954 was named managing director. Mr. Bishop served as chairman of the board in 1957 and retired two years later, retaining only a seat on the board of directors. He leaves his widow, a daughter, and two grandchildren.

Edwin J. Lewis

► Edwin J. Lewis, general manager of replacement sales for the B. F. Goodrich Tire Co., Akron, Ohio, died on July 28 in Akron City Hospital. He was 53 years old. Mr. Lewis was a graduate of the University of Illinois. He joined Goodrich in Chicago in 1930 and, after sales assignments in the Chicago district, was transferred to Akron in 1943 as a member of the company's Advertising Department. Mr. Lewis held several positions in the advertising, sales promotion and tire sales departments, became manager of petroleum company tire sales and later became manager of passenger car tire sales. In 1956, he was named merchandising manager of Goodrich Tire Co. and in 1960 he became general manager of replacement tire sales. Mr. Lewis leaves his wife, a daughter, a son, two grandchildren, and a brother and sister.

Paul A. Dunkel

► Paul A. Dunkel, board chairman of the Paul A. Dunkel Co., New York, N. Y., died on August 29 at the age of 67. Mr. Dunkel was Metropolitan Senior Golf Champion in 1959, and in 1954 and 1957 played with the United States senior international team at St. Andrews and Muirfield, Scotland. Surviving are his widow, two daughters, three brothers, and a sister.

Thin Wall Silicone Tubing

• Ultra-thin wall, large diameter silicone tubing, developed for oxygen regeneration systems in manned space vehicles, is being produced by the Materials Testing Co., Inc., 4932 St. Elmo Ave., Bethesda, Md. The medical-grade silicone tubing is extruded in wall thicknesses of 0.004" to

0.006" with inside diameters of up to 3". Requirements for ultra-thin wall silicone tubing originated in the laboratories of scientists and engineers working on the problem of oxygen recovery systems for manned space vehicles. These scientists required a material capable of separating carbon dioxide from oxygen in the air exhaled by space crew members. Once removed from crew compartment exhaust air, carbon dioxide can be recycled into breathing oxygen by means of algae cultures and other organic regeneration systems.

Goodyear Corrugated Matting

► A new decorator color has been added to the present line of lightweight corrugated floor matting available from the Goodyear Tire & Rubber Co., Akron, Ohio. The color, a light tan, is being added to the one-eighth inch mat selection for use in offices, theatres, and other public buildings where the previously available colors did not complement the color scheme. Corrugations on the matting run the length of the material to keep mud and water from dripping off the sides of the mat. Valleys between corrugations are rounded to keep dirt from being trapped during cleaning. The all-rubber matting is available in roll widths of 24, 36, 48 and 72 inches, in black, brown, grey, green, and the new light tan.

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Color-Striped Insulation

► A color-striped silicone rubber insulation for multi-conductor and single hook-up wire and cable has been developed by the Boston Insulated Wire & Cable Co., 65 Bay Street, Boston 25, Mass. The color-striped insulation is manufactured by

a new process which utilizes a new marking ink. The process, using General Electric silicone rubber, permits the production of insulation with multi-color markings that will not rub off and allows a myriad of color combinations. According to the manufacturer, color-striped silicone rubber insulation permits the use of smaller wires in multi-conductor cables and results in lighter weight, extra flexible, reduced diameter cable. The smaller silicone rubber insulated wires also eliminate braids which are subject to fraying and moisture absorption. The color-striped silicone rubber wire is available in AWG sizes 24 through 10.

Haartz Vinyl Coated Fabrics

► Quality vinyl coated fabrics, produced by a new technique of extrusion coating with vinyl chloride, have been introduced by Haartz Auto Fabrics Co., Boston, Mass. The extrusion coated fabrics are suggested for use as a replacement for convertible auto tops, for auto upholstery, truck seat covers, door liners, head liners, and as boat covers and upholstering for chairs. The new technique reportedly offers several advantages over knife and roller coating methods, since extrusion coated plastisols are pre-fused, thus eliminating subsequent heating steps and eliminating "strike through" problems. In addition, extrusion coating produces little or no shrinkage, according to the manufacturer, assures a better mixing of pigments and fillers, thereby raising the weather-resistance of completed fabrics, provides a higher tear strength than cloth coated by other methods, requires no size coat to control penetration and adhesion, and can be used on a wider variety of substrates, including knitted materials and synthetics.

Disogrin Lug Press-On Wheel

► A new polyurethane lug press-on wheel which has twice as many lugs as other press-ons has been developed by Disogrin Industries, 510 South Fulton Ave., Mount Vernon, N. Y. The additional lugs are said to provide better grip and increased traction for the new material handling truck wheel, making the press-on ideally suited for use on docks, ramps and inclines. Tradenamed Disowheel, it is particularly useful on slippery surfaces, the company reports, since it prevents skidding or slipping, thus reducing safety hazards and possible truck and load damage. Made of Disogrin, the company's polyurethane elastomer, the wheel is reported to have a resiliency that resists abrasion and prevents the lugs from "chunking" out in a short time. Available as cushion-type or solid-type tires, in standard press-on sizes, the Disowheels will fit any electric- or gas-powered materials handling truck.

Sqair-Pak Dunnage Bags

► A square-cornered rubberized fabric bag that inflates to act as a shock absorber, cushioning freight against damage, is available from B. F. Goodrich Aerospace and Defense Products, a division of the B. F. Goodrich Co., Akron, Ohio. The new Sqair-Pak dunnage bags are inserted as resilient air columns between sections of heavy but fragile loads. Inflated in minutes by air hose and a portable air compressor, the bags are designed to take the place of expensive, time-consuming installations of wood and strapping customarily used for shoring loads. The bags are easily deflated for unloading and are reusable indefinitely. The company reports that the square corner construction of the bag greatly improves efficiency of pneumatic dunnage systems. Standard sizes of Sqair-Pak bags range from 24 to 48-inch widths, with lengths from 60 to 108 inches.

Charco Coated Clamps

► Rubber coated, non-slip clamps have been added to the line of Bulldog blanket and wire clamps of the Charleston Rubber Co., 98 Stark Industrial Park, Charleston, S. C. Any of the present clamps in the Bulldog line, which are used by electric utilities in high voltage work, are now available with the new rubber coating. The coating is obtained by dipping Charco clamps into a special roughening solution of neoprene rubber. The clamp is then subjected to heat, which cures the rubber and bonds it firmly to the wood. According to the manufacturer, Charco rubber coated clamps are resistant to absorption of oil, water, creosote and other chemicals.

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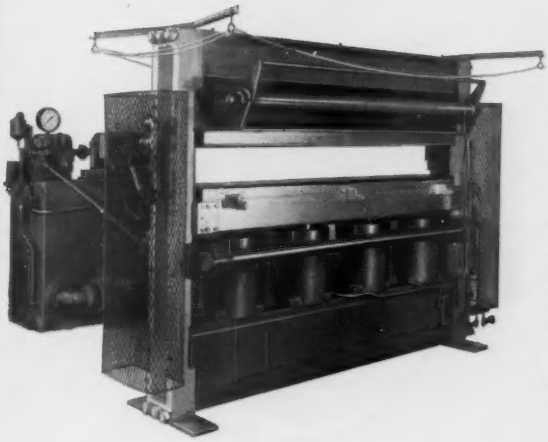

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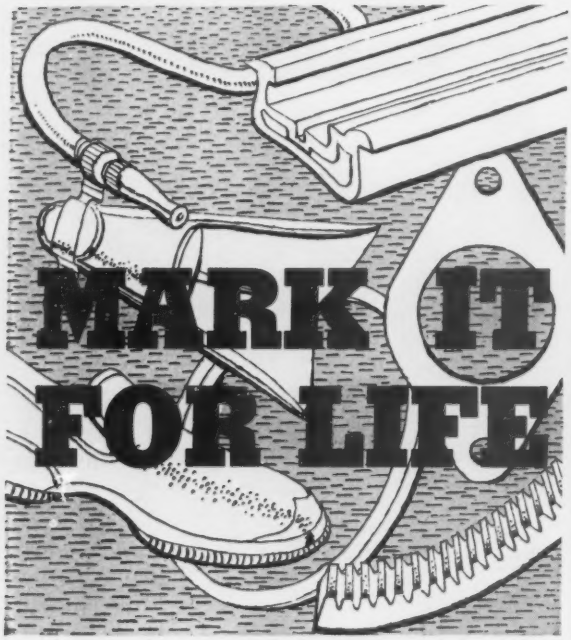

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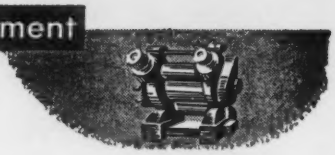
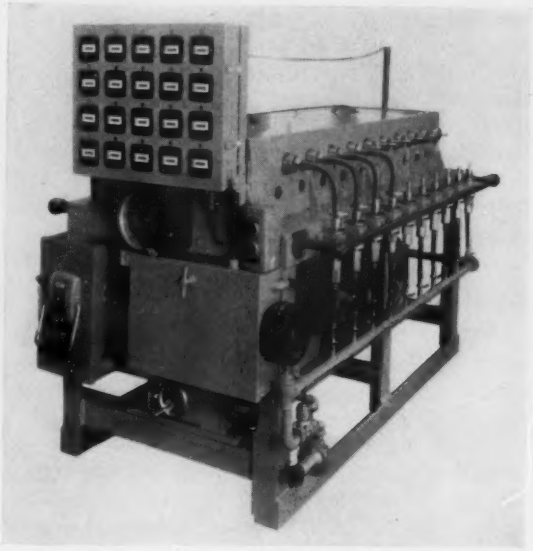


Scott Fatigue Tester

► Complete testing apparatus for evaluating extension and compression fatigue of tire cord in accordance with the Goodyear Tube Fatigue Method is now being offered by Scott Testers, Inc., 85 Blackstone Street, Providence, R. I. The Model GTF Tester features recent design



improvements developed by the Comptoir des Textiles Artificiels of France, and is based on an original design by the Goodyear Tire & Rubber Co. to conform with ASTM Method D-885-59T. Unlike the original design wherein failure of a single tube specimen completed the test run, the improved design now permits the tester to continue to operate despite blowout of one or more of the 20 specimens under test.

The addition of this continuing testing feature requires expansion of the recording of the test results. This can be accomplished by either a strip recorder which plots operation of individual samples continuously against time, or through 20 individual, electrically operated counters, each connected to an individual sample station. With the latter, each counter reports directly the time run, which can then be multiplied by the number of flexes per unit of time to give the value.

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Brabender Measuring Head

► An extruder measuring head for its variable shear rate Plasti-Corder has been introduced by C. W. Brabender Instruments, Inc., South Hackensack, N. J. The ¾-inch extruder attachment is designed to measure and record torque required to process polymers under a wide range of screw

speed rates and barrel zone temperatures. It will supplement the Plasti-Corder's other polymer measuring heads, adding to the machine the ability to measure polymer extrusion rates, extrudate surface conditions and the effect of lubricants. The extruder has two electrically heated barrel zones and a selection of interchangeable electrically heated dies. Three electronic proportioning controllers regulate and maintain zone and die temperatures.

P-E Spectrophotometer

► A low-cost ultraviolet-visible spectrophotometer, called Model 202, has been added to its line by the Perkin-Elmer Corp., Norwalk, Conn. The key features of the instrument are said to be its optical null principle, an automatic gain control system, a 60° prism for high dispersion, and its accurate photometric performance. Model 202 covers two ranges: 190 to 390 millimicrons in the ultraviolet and 350 to 750 millimicrons in the visible. In addition, wave length accuracy is said to be better than ± 0.5 millimicrons in the ultraviolet and ± 1.0 millimicrons in the visible.

G-E Speed Drives

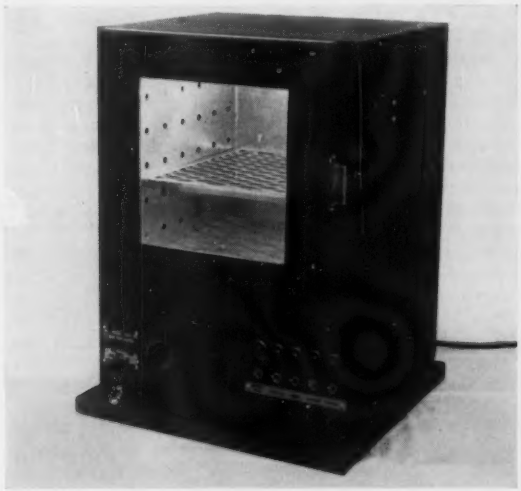
► A line of eddy current coupling adjustable speed drives from 5 to 100 hp has been developed by the Direct Current & Generator Department, General Electric Co., Erie, Penna. The line, called Kinatrol, is engineered for a broad range of applications on rubber industry equipment such as calenders, extruders, take-ups, and capstans. The Kinatrol line is being offered as a complete package.

TMI Specimen Cutter

► A cutter for producing a specimen for the Mooney viscometer test is available from Testing Machines, Inc., 72 Jericho Turnpike, Mineola, N. Y. The cutter produces two discs 1¾ inches in diameter, one blank and the other containing a hole ⅜ inch diameter in the center. According to TMI, the cutter is easily used in a standard specimen cutting press. It can then be applied in a controlled manner without driving the blades deeply into some hard backing material.

Ozone Test Chamber

► A miniature ozone test chamber of one cubic foot capacity has been introduced by Ozone Research & Equipment Corp., 3840 North 40th Avenue, Phoenix, Ariz. The test chamber is designed to fill the needs of modest ozone test programs and to act as an overflow chamber for



overflow programs. The unit is manually controlled and provides ozone concentrations from 25 to 700 pphm/volume and temperature adjustment up to 150° F. The company states that the miniature chamber Model MS incorporates all the significant features of standard ozone chambers: stainless steel oven, interior light, glass observation window, air recirculation and air flow. The ozone chamber weighs 85 pounds and consumes 275 watts at 115 volts. Over-all dimensions are 15 x 20½ x 16 inches. A companion Model MSA provides .005 to .030 per cent concentration range for wire and cable tests.

► Pre-setting of control switches to trigger motors, bells, lights, etc., at desired load points is said to be accomplished, without the use of specialized calibrating equipment, with the new Micro-Switch Force Gauge available from W. C. Dillon & Co., Inc., Van Nuys, Calif.

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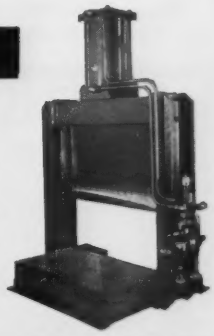

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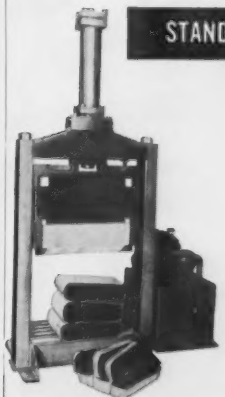

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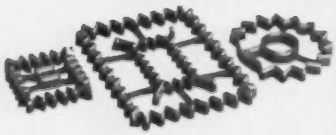

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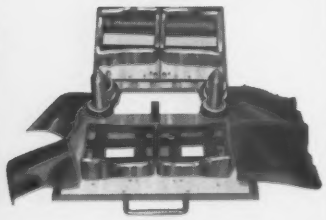

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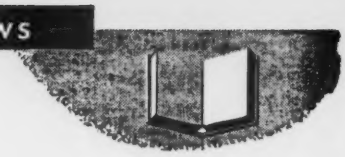
Reviews



Silicones. Edited by S. Fordham, Ph.D. Published by Philosophical Library, 15 E. 40th St., New York 16, N. Y. 6 x 9 in., 252 pp. $10.00.

This book is of the "survey" type, in which a competent editor assembles a series of chapters written by experts around his basic outline, then pulls them together to form a totality. How well the book itself comes off is consequently a function of the knowledgeability of the creating editor, the know-how of those who prepare the various chapters for him, and the diligence of all concerned in preparing their specific copy. In this case, the editor is involved in the Research and Development Department of the Nobel Division of ICI.

The writers, not surprisingly, have, in his words, "drawn considerably on their experience in the Silicones and Research Departments of Nobel Division . . . and the book has, in fact, been made possible only by the agreement and cooperation of this firm."

Explicit goals of the book are to introduce the reader to the present state of organosilicon chemistry, and to provide an outline of the industrial manufacture and application of silicones.

Straightforward organization is used: the first part, on organosilicon chemistry, touches on historical background, chemistry, and properties. The second part, considerably longer, introduces the reader to commercial aspects, manufacture, then to silicone fluids and lubricants, silicone rubbers, resins, electrical properties and applications of silicones, silicone masonry water-repellents, textile treatment with silicones, and miscellaneous uses.

By way of summing up, it might be said that the editor has done an exceptional job in building a unified work from the separate parts he started with. Changes in style from chapter to chapter are hardly apparent, there is a good deal of cross-referencing, indicating care in preparation of the final manuscript, and documentation has been carefully handled.

The chapter on Silicone Rubbers is as broad a description as one might hope for, with references to the three major US producers, as well as to ICI and its English competitors. Emphasis is placed on manufacturing of the rubber, compounding ingredients, and possible applications. Application technology, of say, molding, is largely ignored.

All in all, this is a workmanlike job, exceptionally well edited, carefully assembled. It should be of value to both chemists, and rubber technologists concerned with the field.

•

Small Business and Pattern Bargaining. By Walter H. Carpenter, Jr., and Edward Handler. Published by Babson Institute Press, Babson Park 57, Mass. 6 x 9 in. Softbound; 243 pp. $3.00.

This Small Business Management Research Report was prepared and published under a research grant from the Small Business Administration; while only a short edition of the complete text was printed, an abstract under the same title, available free from the SBA, will shortly be available.

The purpose of this study is to determine the extent to which the contract settlements completed by large unions and large companies influence small firms. The two industries selected for study by the research group were meat packing, and rubber tire manufacturing.

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Quality Control in the Rubber Industry

by

Simon Collier and Edward A. Reynolds

36 pp. 8½ x 11 in. $2.50

A new booklet designed to help the technical executive better understand and use new concepts in quality control, its organization and techniques. Originally published as a five-part article in the February through June, 1961 issues of RUBBER AGE, this booklet now makes available in one handy source all the material and data which has attracted so much industry attention.

Part I — Introduction.

Part II — Functions, Organization and Personnel. Information as to the responsibilities of other company departments and details as to the quality control organization and the training, direction and evaluation of personnel.

Part III — Statistics. Statistical methods, including routine control, experimentation, trouble shooting, evaluation and effective use for economical maintenance of product quality.

Part IV — Records, Reports and Data Handling. The need for records, the various types, and some methods for their simplification. Samples of different records and comments on QC graphs, files and data retrieval.

Part V — Engineering Aspects. Problems of specifications; visual standards, sorting inspections; automatic process controls, and non-destructive laboratory and life testing techniques.

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Following an introduction to the nature of the study, and the concepts being dealt with, the authors provide a portrait of the two industries. (Pattern bargaining has been most conspicuous in the steel and automotive industries. Typically a leading firm in the industry will "settle" first, then smaller firms will drop into line with only minor variations in the "pattern" contract established by the leading firm. In the rubber industry, the Big Four tire companies tried joint bargaining on wages immediately after World War II, but discontinued this in 1947. The predominant union (URW) pressed for company-wide agreements which became the practice by April, 1948.

The portrait of the rubber tire manufacturing industry is outlined with a description of its structure: 18 firms in all, consisting of the Big Four, one large and diversified firm (and the only one omitted from this study — for this reason), plus 13 independent, relatively smaller companies. This skeleton is then filled in with a description of the competitive relationships. A final segment describes the unions in rubber tires and tubes.

After a similar analysis of the meat packing industry, the authors detail the extent of pattern following in the tire industry among the independents. Here, wage increments, levels, fringe benefits, and working agreements are discussed point by point and the deviations that occur are dissected.

Subsequent chapters cover the scope of negotiations, the locus of union decision making, the various reactions to pattern following among those involved, and a final chapter on policy guides to collective bargaining.

This volume is a superb example of the type of research currently being carried on in the social sciences. Statements of fact and interpretative conclusions are documented with the collected data. Those persons involved in industrial management or personnel work should find this book a source of much information.

BOOKLETS, CATALOGS, etc.

Modern Living Gains So Much from Reclaimed Rubber. U. S. Rubber Reclaiming Co., Inc., P.O. Box 365, Buffalo 5, N. Y. 8½ x 11 in. 12 pp.

This booklet briefly outlines the growth of the rubber reclaiming industry, and discusses a number of important applications for reclaimed rubber products, including Ramflex, a product said to impart new properties to asphaltic type pavement, and Saf-Pla, a resilient material developed for playgrounds. The illustrated booklet also describes how a specially-designed machine, the Reclaimator, processes scrap rubber in seconds to achieve a uniform product.

•

Synpol for Wire and Cable Applications. (Technical Data Synpol Application Bulletin No. 4, October 1960.) Texas-U. S. Chemical Co., 9 Rockefeller Plaza, New York 20, N. Y. 8½ x 11 in. 11 pp.

This bulletin lists the current types of Synpol polymers recommended for use in wire and cable insulations, and points out specific, proven areas of application. Suggestions and comparisons are made relative to the various specifications set up within the industry. In addition, compounding and processing data are included. Tables of property data are presented to facilitate material selection.

May We Help You? Perkin-Elmer Corp., Main Ave., Norwalk, Conn. 7 x 7 in. 8 pp.

The wide range of services established to assist users of Perkin-Elmer products in applying or evaluating its instrumentation are discussed in this booklet. These services include analytical feasibility studies and customer training in the company's Sales Service Laboratories, support from its Applications Engineering Department and its service and sales engineering facilities, as well as technical news publications available to the instrument user. The booklet is designed to publicize these supporting activities, which serve as a source of information for new developments in the field, as well as an aid in achieving optimum instrument performance.

•

Reclaimed Rubber. Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. 8½ x 11 in. 20 pp.

This technical bulletin lists and describes the various types of reclaimed rubbers manufactured by Naugatuck Chemical. It tells how reclaimed rubber lowers processing and compounding costs and increases the technological advantages of products. The illustrated booklet also presents a table classifying Naugatuck reclaims by application and by scrap source for the convenience of readers.

•

Grinding and Mixing Equipment. Paul O. Abbe, Inc., 141 Center Ave., Little Falls, N. J. 8½ x 11 in. 6 pp.

Construction features, advantages, and chief applications for the company's line of ball and pebble mills, mass and paste mixers, rota-cone blenders and vacuum dryers, jar mills and jar rolling mills, ribbon mixers, and lump breakers are described. The folder includes photographs of the equipment, as well as tables showing standard sizes and capacity.

•

Industrial Gloves. (Booklet 6500.) B. F. Goodrich Industrial Products Co., Akron, Ohio. 8½ x 11 in. 8 pp.

This illustrated catalog is a guide to the selection of industrial gloves for handling nearly 400 different chemicals. The publication includes a performance chart which rates the comparative wear and chemical resistance of neoprene, neoprene-coated, Koroseal-coated, and rubber gloves. Each of the 16 different kinds of BFG industrial gloves is described and illustrated.

•

Hardness Testers. Testing Machines Inc., 72 Jericho Turnpike, Mineola, L. I., N. Y. 6 x 8½ in. 4 pp.

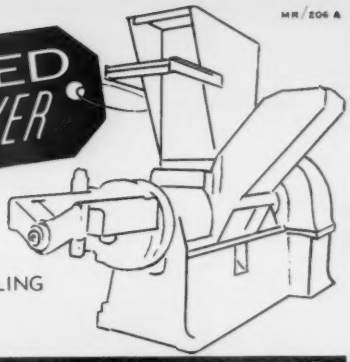
The Wallace Dead Load Hardness Tester and the Wallace Hardness Meter are described in this illustrated booklet. The instruments were designed to measure the hardness of rubber and rubberlike materials to laboratory standards of accuracy. Also included is an approximate hardness scale correlation table for natural rubbers, and notes on the international standard rubber hardness test.

•

Dillon Dyna-Switch. W. C. Dillon & Co., Inc., 14620 Keswick St., Van Nuys, Calif. 8½ x 11 in. 4 pp.

A new patented device which automatically cuts the power supply when a hoist or crane approaches the overload stage is the subject of this brochure. Photos, schematic diagrams, and text describe the Dyna-Switch's operation, and outline applications for safeguarding personnel and equipment.

MR/206 A



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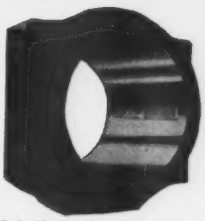

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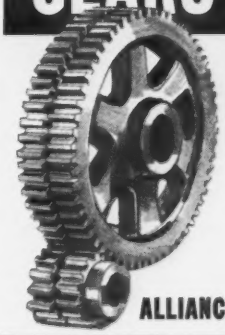

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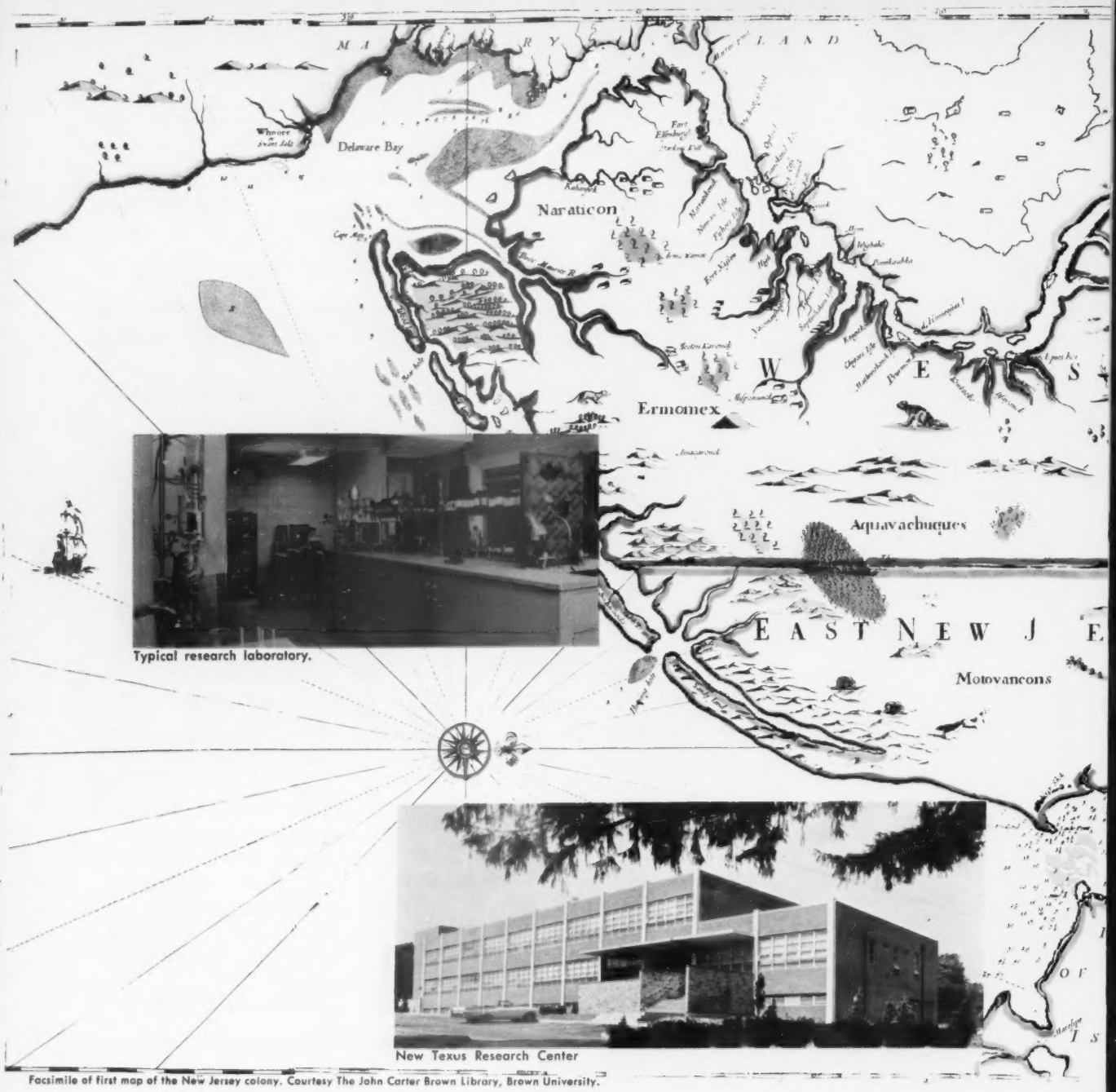

Typical research laboratory.

New Texus Research Center

Facsimile of first map of the New Jersey colony. Courtesy The John Carter Brown Library, Brown University.

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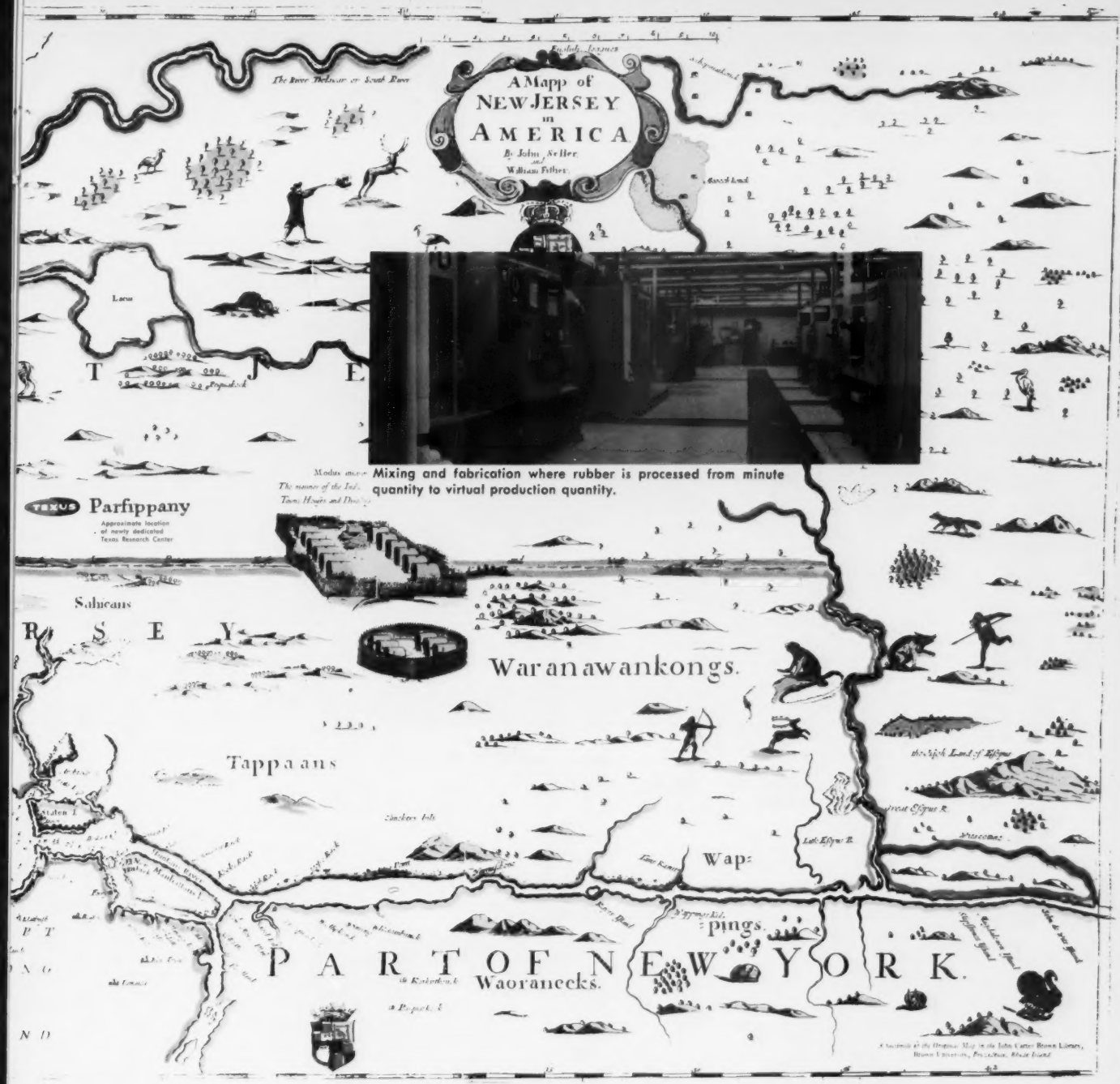

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MARKET REPORTS

TRENDS
NEWS
PRICES

NEW YORK, OCTOBER 2, 1961

Natural Rubber

The price of spot rubber on the New York Commodity Exchange moved in the extremely narrow range of 75 points since our last report (September 1), high for the period being 30.50c reached on September 6 and on six other days in the month and low being 29.75c reached on September 28. The average price of spot rubber for the month of September was 30.22c based on 20 trading days. This compares with an average of 30.05c in the previous month.

Commodity experts at Merrill Lynch, Pierce, Fenner & Smith point out that rubber prices have been wandering aimlessly during the past month, looking for direction. This usually is the time when fall ordering commences and prices show some strengthening tendencies. However, business to date for late 1961 deliveries has been almost completely missing with nearby demand only spotty and of a fill-in nature.

As long as rubber sells for 30c a pound, the G.S.A. stands ready to sell to all comers so long as they are U. S. consumers. Since this minimum price was maintained to September 26, a steady source of supply was available. Even below the minimum price some rubber may eventually become available if it is designated as "deteriorating."

Political Situation

So far as can be determined, the political situation in Berlin and elsewhere has had little effect on market movement in New York. Reports from the London market are similar. Not since last February has natural rubber fallen as low as 2 shillings a pound in London, the level at which it becomes roughly competitive with synthetic. One possible explanation being offered for the consistency of the market is purchasing by Russia.

The United Kingdom, for instance, reexported about 57,000 tons of rubber to Russia in the first half of this year, compared with only 14,000 tons in the same period in 1960.

A broadly similar increase took place in Russian imports from Malaya, and although figures from Ceylon and Indonesia are slow to be placed there are indications that shipments to Russia from these two countries have also risen.

Malayan Exports

August exports of sheets and crepe from Malaya amounted to 97,000 tons, up substantially from the 85,900 tons shipped in July. Eight months totals of 690,000 tons are almost 60,000 tons more than during the first ⅔rds of last year. An analysis of these eight month figures reveals that the U. S. has contributed very little to the 10 per cent increase, with shipments up only 1,400 tons, reflecting the slow demand.

Price Data

Closing Rubber Prices on New York Commodity Exchange

SEPTEMBER 1 TO SEPTEMBER 30

Sept.	Spot	Nov.	Jan.	Mar.	Spot
1	30.38	29.95	29.90	29.80	0
2	....	....	....	....	..
3	....	....	....	....	..
4	....	....	....	....	..
5	30.50	30.13	30.00	30.00	5
6	30.50	30.05	30.00	29.95	10
7	30.50	30.10	29.95	29.80	10
8	30.50	30.05	29.90	29.80	0
9	....	....	....	....	..
10	....	....	....	....	..
11	30.50	30.15	29.80	29.80	0
12	30.38	30.00	29.75	29.75	5
13	30.25	29.40	29.25	29.00	6
14	30.12	29.35	29.25	29.25	1
15	30.00	29.45	29.45	29.45	0
16	....	....	....	....	..
17	....	....	....	....	..
18	30.00	29.65	29.50	29.50	0
19	30.50	30.00	29.75	29.40	11
20	30.50	30.00	29.65	29.45	0
21	30.25	29.60	29.30	29.30	0
22	30.00	29.50	29.10	28.90	1
23	....	....	....	....	..
24	....	....	....	....	..
25	30.00	29.60	29.13	29.00	0
26	29.88	29.55	29.00	28.85	25
27	29.88	29.60	29.25	29.04	0
28	29.75	29.40	28.95	28.95	2
29	30.00	29.45	29.10	29.00	0
30	....	....	....	....	..

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.30
Oct.	.29½
Nov.	.29¼
Thin Latex Crepe:	
Spot	.32⅞
Thin Brown Crepe, No. 2	.28¼
Flat Bark Crepe	.22½

London Market
(Standard Smoked Sheets)

Nov.	29.32 — 29.46
Dec.	29.46 — 29.61

Singapore Market
(Standard Smoked Sheets)

Nov.	27.80 — 27.88

Middling Upland Quotations

	Aug. 31	September 29		
	Close	High	Low	Close
Oct.	34.48	34.39	34.35	34.46
Dec.	35.02	34.87	34.84	34.85
Mar.	35.68	35.57	35.50	35.53

Notes & Quotes

The year 1962 will be a "very good year" for business in general and the rubber industry in particular, according to R. E. Davis, director of business research for Goodyear Tire & Rubber Co. The economist predicted tire shipments of 122 million units this year, and an all-time peak of 130 million next year. Other growth factors he cites are (1) expansion in other car uses for rubber, (2) diversification, and (3) new basic materials.

Synthetic Rubber

According to current reports, butyl rubber is expanding in usage as new markets are opened up and established markets broadened. The only domestic producer, Humble Oil and Refining Co., has expanded its facilities and introduced new grades of the synthetic material in an effort to capture a larger share of the total rubber market.

According to the *New York Journal of Commerce* domestic production of butyl this year will probably run about 110,000 long tons or close to 70 per cent of capacity. Approximately 10 per cent of this will be consumed in tire manufacture. Production estimates are placed at about 2¼ million tires.

So far, five companies are making or selling all-butyl tires and a sixth, General Tire & Rubber Co., may enter the field shortly.

Mechanical Goods

Another rapidly growing market for butyl is in mechanical goods. In 1955, five per cent of Humble's output will be used to produce mechanical goods.

One of the newest uses is in the 1962 Lincolns and Ford Thunderbirds. The application involves a butyl molding that fits around the springs and isolates sound and vibration. Each part weighs about two pounds.

The average use of butyl in automobiles is two to three pounds, with some makes such as the Pontiac, using 15 pounds of butyl. Chrysler utilizes four to five pounds per car.

Inner tubes and bags for making tires still account for the major part of Humble's butyl production but this appears to be trending downward. In 1961, some 60 per cent of Humble's production will go into this market as against 80 per cent in 1955.

Wire and cable coatings represent another outlet for butyl with about 5,500 long tons going into this market this year. Growth is nominal and runs about 1 to 2 per cent a year.

Over-All Market

The over-all market for butyl is growing, with the average annual growth in the past about 7 to 10 per cent. With the introduction of the butyl tires, the growth rate is increasing slightly and is indicated at 10 to 12 per cent, the *Journal of Commerce* states.

Next to Humble, Russia is said to be the largest producer of butyl with reports indicating a capacity of 50,000 to 75,000 long tons. Polymer Corp. of Canada can, reportedly, produce 25,000 to 30,000 long tons a year, while in Port Jerome, France, there are units capable of making about 20,000 long tons.

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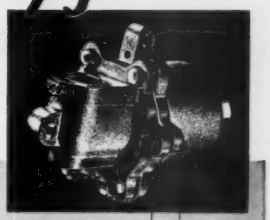

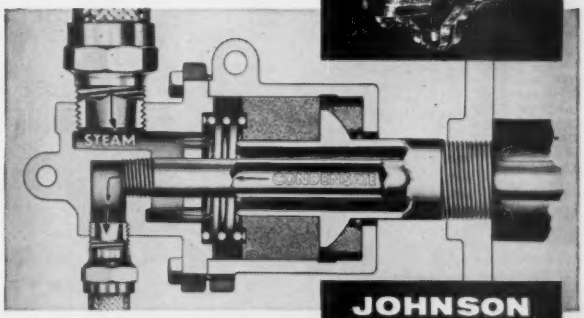

Type SB illustrated is completely self-supporting. For fully engineering data write for Bulletin S-3002.

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PRICES OF COMMERCIALLY AVAILABLE

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900
Butaprene NH	.6500
Butaprene NL	.5000
Butaprene NXM	.5800
Chemigum N3NS and N5	.5800
Chemigum N6	.5000
Chemigum N6B and N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
Hycar 1001 and 1041	.5800
Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
Hycar 1441	.6200
Paracril AJ	.4850
Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.6300
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801 and 805	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803 and 804	.5000

Butadiene-Styrene Types

Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1509 and 1511	.2410
Ameripol 1000 and 1001	.2410
Ameripol 1605	.1900
Ameripol 1606	.1820
Ameripol 1608	.1845
Ameripol 1609	.2080
Ameripol 1610	.1870
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 1805	.1550
Ameripol 1808	.1480
Ameripol 1809	.1545
Ameripol 1810	.1400
Ameripol 4600 and 4601	.2410
Ameripol 4604	.2410
Ameripol 4651	.1770
Ameripol 4659	.1820
Ameripol 4660	.1870
Ameripol 4664	.1845
Ameripol 4667	.2080
Ameripol 4700	.1750
Ameripol 4756	.1545
Ameripol 4758	.1450
Ameripol 4759	.1598
Ameripol 4760	.1576
Ameripol 4761	.1710
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500 and 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASRC 1712	.1885
ASRC 1713	.1750
ASRC 3105 and 3106	.2410
ASRC 3110	.2600
B-123	.1820
Baytown B-134	.1900
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1603A	.1960
Baytown 1605A	.1900
Baytown 1606	.1820
Baytown 1608	.1845
Baytown 1609	.2080
Baytown 1801	.1760
Baytown 1803A	.1740
Baytown 1805A	.1550
Baytown 1808	.1480
Baytown 1811	.1569
Baytown 1813	.1640
Baytown 1815	.1496
Baytown 1816	.1580
Baytown 8600	.2410
Baytown 8676	.1876
Baytown 8679	.2022
Baytown 8681	.1835
Baytown 8682	.1890
Baytown 8700	.1885
Baytown 8775	.1545
Baytown 8776	.1679
Baytown 8781	.1655
Baytown 8782	.1583
Baytown 8783	.1515
Baytown 8784	.1598
C-102 (Shell)	.2300
Carbomix 1606	.1820
Carbomix 1608	.1845
Carbomix 1609	.2080
Carbomix 1808	.1480
Carbomix 1809	.1545
Carbomix 1811	.1569
Carbomix 1813	.1640
Carbomix 1814	.1545
Carbomix 1815	.1496
Carbomix 1817	.1715
Carbomix 3761	.1576
Carbomix 3764	.1685
CB-102 (Shell)	.1850
Copo 1006	.2410
Copo 1500	.2410
Copo 1502	.2410
Copo 1505 NS	.2610
Copo 1507	.2410
Copo 1510	.2410
Copo 1712	.1885
Copo 1713	.1750
Copo 1714	.1725
Copo 1778	.1910
FR-S 146	.2410
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 181 and 182	.2410
FR-S 184	.1885
FR-S 1000	.2410
FR-S 1001	.1410
FR-S 1004 and 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2410
FR-S 1014	.2810
FR-S 1500 and 1502	.2410
FR-S 1703	.2060
FR-S 1710 and 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1015	.3500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1022	.3050
Naugapol 1023	.3300
Naugapol 1503	.2625
Naugapol 1504	.3500
Naugapol 6003	.2700
Naugapol 6100	.3200
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113C (Shell)	.1750
OB-114C (Shell)	.1420
OB-116 (Shell)	.1810
Philprene 1000	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500 and 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1960
Philprene 1605	.1900
Philprene 1606	.1820
Philprene 1608	.1845
Philprene 1609	.2080
Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Philprene 1808	.1480
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1508	.2410
Plioflex 1510	.2410
Plioflex 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Kryflex 202	.2535
Polysar Kryflex 252	.2700
Polysar Krylene, NS and 602	.2410
Polysar Krynol 651 and 653	.1885
Polysar Krynol 652 and 654	.1910
Polysar Krynol 655	.1885
Polysar S and S-630	.2410
Polysar SS-250	.2875
Polysar S-X370	.2475
Polysar S-X371	.2550
S-1000	.2410
S-1002	.2435
S-1006	.2410
S-1009	.2475
S-1011	.2475
S-1013	.2410
S-1500	.2410
S-1502	.2410
S-1509	.2410
S-1703	.2060
S-1707	.1910
S-1709	.1885
S-1710	.1885
S-1712	.1885
S-1778	.1910
S-7501	.2410
S-7652	.1960
S-7702	.1750
SP-102	.2600
SP-103	.2600
Synpol 1000 and 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1013	.2410
Synpol 1061 and 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707 and 1708	.1910
Synpol 1712	.1885
Synpol 8103	.2401
Synpol 8151	.1820
Synpol 8152	.1860
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8202	.1725
Synpol 8208	.1750
Synpol 8255	.1480
Synpol 8253	.1584
Synpol 8254	.1545
Synpol 8266	.1598
Synpol 8267	.1640

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215 and 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Enjay Butyl 10-65 and 10-66	.3000
Enjay Butyl 10-67	.3000
Polysar Butyl 100 and 200	.2300
Polysar Butyl 101	.2775
Polysar Butyl 300 and 301	.2300
Polysar Butyl 400	.2300
Polysar Butyl 402, 450	.2400
Polysar Butyl 600	.2750

SYNTHETIC RUBBER POLYMERS

Chlorosulfonated Polyethylene

Hypalon 20	.4700 [3]
Hypalon 30	.6000 [3]
Hypalon 40	.5000 [3]

Fluoroelastomers

Fluorel	$10.25 [4]
Kel-F 3700 and 5500	$16.00 [2]
Viton A and A-HV	$10.00 [2]
Viton B	$10.00 [2]

Isoprene Rubber

Shell 300 and 305	.2500 [2]
Shell 307	.2600 [2]
Shell 500	.2150 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [3]
Neoprene Type AD	.5500 [3]
Neoprene Type FB	.6500 [3]
Neoprene Type GN	.4100 [3]
Neoprene Type GN-A	.4100 [3]
Neoprene Type GRT	.4200 [3]
Neoprene Type KNR	.7500 [3]
Neoprene Type S	.4200 [3]
Neoprene Type W	.3900 [3]
Neoprene Type WB	.4100 [3]
Neoprene Type WHV	.3700 [2]
Neoprene Type WKT	.4500 [3]
Neoprene Type WX	.4100 [3]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.6000 [2]
Thiokol Type FA	.7400 [2]
Thiokol Type ST	1.2500 [3]

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.17 [3]
GE Silicone Gum (not compounded)	3.68 [3]
Silastic (compounded)	2.56 [3]
Silastic (gums)	4.00 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [3]
Butaprene N-400 and N-401	.5400 [3]
Chemigum 200	.4800 [3]
Chemigum 235	.5300 [3]
Chemigum 236	.5300 [3]
Chemigum 245	.4500 [3]
Chemigum 246	.4500 [3]
Chemigum 247	.4500 [3]
Chemigum 248	.4500 [3]
Hycar 1512	.4500 [3]
Hycar 1551	.5300 [3]
Hycar 1552	.4500 [3]
Hycar 1561	.5300 [3]
Hycar 1562	.4500 [3]
Hycar 1571	.5300 [3]
Hycar 1572	.4500 [3]
Hycar 1577	.4500 [3]
Nitrex 2612	.4500 [1]
Nitrex 2616	.5300 [1]
Nitrex 2620	.4500 [1]
Nitrex 2625	.4500 [1]
Polysar Latex XPRD-845	.4900 [2]
Tylac 640 and 650	.4500 [1]
Tylac 750	.4900 [1]
Tylac 850	.5300 [1]
Tylac 1640 and 1650	.5400 [1]
Tylac 2430	.5000 [1]
Tylac 2830	.4500 [1]

Butadiene-Styrene Types

CL-101 (Shell)	.2800 [3]
Copo 2000	.2750 [3]
Copo 2101	.3000 [4]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3000 [3]
Copo 2109	.2775 [3]
Copo 2110	.3200 [3]
Copo 3852	.3000 [3]
FR-S 110	.3000 [3]
FR-S 150	.3000 [3]
FR-S 151	.2900 [4]
FR-S 174	.2950 [3]
FR-S 176	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000 and 2001	.2750 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [4]
Naugatex 2105 and 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Naugatex 2113	.2900 [1]
Naugatex J-8174-F	.3200 [1]
Naugatex J-8855	.3000 [1]
Naugatex J-9049	.2750 [3]
Naugatex J-9064	.3050 [1]
Pliolite 2000 and 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105 and 2107	.3200 [3]
Pliolite 2108	.3000 [3]
Polysar Latex IV	.2775 [3]
Polysar Latex 722	.3200 [3]
Polysar Latex 723	.3200 [3]
Polysar Latex 741	.3000 [3]
Polysar Latex 781	.6750 [2]
S-2000 and S-2006	.2600 [3]
S-2101	.2600 [3]
S-2105	.2800 [3]
S-2108	.2900 [3]
Tylac 405, 430, 450A	.2750 [1]
Tylac 410	.2900 [1]
Tylac 1705	.3200 [1]
Tylac 1757	.3000 [1]
Tylac 3040 and 3340	.3200 [1]
Tylac 3410-A	.2750 [1]
Tylac 3500-L	.2950 [1]
Tylac 3540	.3200 [1]

Butyl

Butyl Latex 80-21	.3500 [2]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [2]
Neoprene Latex 842-A	.3500 [2]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [3]
Thiokol Type WD-2	1.2500 [3]
Thiokol Type WD-6	.8000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. (4) Freight equalized. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

SUPPLIERS

are your materials listed in the Market Prices Section? If not, forward full information to —

Market Editor RUBBER AGE

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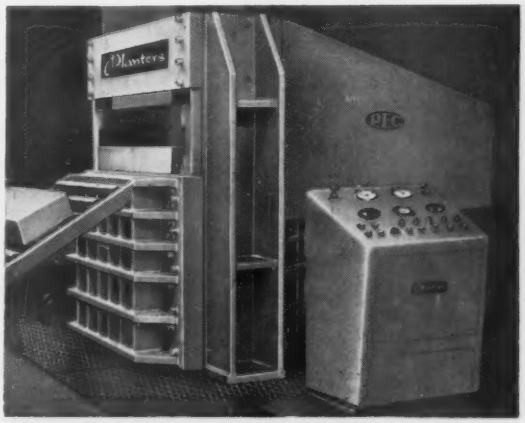

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MARKETS

(continued)

Reclaimed Rubber

In the first eight months of this year a total of 175,688 long tons of reclaimed rubber was produced in the United States. The Rubber Manufacturers Association reports that in the same period, 164,292 long tons of reclaimed rubber were consumed in the United States and that as of August 31, 1961, there were 33,571 long tons of reclaim in stocks on hand.

In the first eight months of 1960, 190,911 long tons of reclaim were consumed, and in all of that year 278,763 long tons were consumed. With these figures on hand it will be seen that total consumption of reclaim in 1961 will approach a 240-250,000 ton mark.

Prices this year have remained stable and there have been relatively few disrupting market factors. The decline in 1961 consumption from 1960 consumption can only be attributed to the general economy.

(Prices for All Areas Except West Coast)
(Average price, carload quantities, minimum freight allowed)

	per lb.
First Line Whole Tire	.11½
First Line Whole Tire Stainless	.12¼
Second Line Whole Tire	.11
Third Line Whole Tire	.10¾
Fourth Line Whole Tire	.10¼
Black Carcass	.15¾
Peelings	.11½
Butyl Tube	.16
Natural Rubber Black Tube	.17
Natural Rubber Red Tube	.21
Mechanical, Light Color, Low Gravity	.26
Mechanical, Light Color, Medium Gravity	.20

Scrap Rubber

Scrap rubber sales have maintained a fairly good pace during the past few weeks with movements involving substantial tonnages. Scrap rubber consumption is reportedly running steady with last year's levels. Prices are generally unchanged.

Scrap rubber exports during June totaled 3,201,933 pounds with a dollar value of $158,003. These figures were below the 3,411,234 pounds shipped in the previous month. Spain was the principal importer during June, taking 1,251,443 pounds of scrap rubber.

The Rubber Manufacturers Association reports that in the first eight months of this year a total of 162,837 long tons of scrap rubber were consumed in the United States.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.06
No. 1 peelings	ton	38.00
No. 2 peelings	ton	27.00
No. 3 peelings	ton	20.00
Buffings	ton	14.00
Truck and Bus S.A.G.	ton	19.00
Passenger S.A.G.	ton	19.00
Natural Rubber Red Tubes	lb.	.08
Natural Rubber Black Tubes	lb.	.07
Butyl Rubber Tubes	lb.	.07¼

Tire Fabrics

Extruded polyester (Dacron) tire cord is being readied for public unveiling. Goodyear reports that it has solved the adhesion problem using a two-dip system, the first to bond the fiber, the second to bond the rubber. While the technique is still regarded as experimental, Goodyear's manager of fabric and adhesives development reports field testing is underway.

The advantages of the polyester fiber are that it combines the strength of nylon and the even ride (relatively little thumping caused by flat spots) of rayon. One disadvantage is cost at the present time, but with the potential market, this problem would probably be solved shortly.

It is reported that current developments are concentrated on passenger tires (where it will give tire manufacturers a "premium" feature lost since nylon cords became available in cheaper tires) but that the fiber will be tried on truck casings when the price is lower and the strength is higher. The material's strength is somewhat lower than nylon but is well ahead of rayon.

While commercial production of tires employing polyester cords may be about a year away, research on polyolefins as their successors has already begun, according to trade sources.

Here and There

Chemstrand has announced plans for the increase of its nylon 66 fiber output capacity by 200 per cent at its Greenwood, S. C., plant. This plant's capacity is just under 15 million pounds annually now, and expected output will be around 40 million pounds. Expansion of the Greenwood plant is expected to be completed by May 1962.

Cord Production

First quarter 1961 production of tire and cord and fabric, excluding chafer and similar fabrics, has been reported at 88,000,000 pounds, down 17 per cent from the first quarter total of 1960. Within this total, rayon cord and fabric declined 19 per cent or 13,000,000 pounds to the first quarter level of 56,000,000 while nylon decreased 14 per cent or 5,000,000 pounds to 31,000,000.

Nylon cord and fabric production has been erratic over the past several quarters but in the first quarter of 1961 increased 2,000,000 pounds over the last quarter of 1960. Rayon cord and fabric production showed the same amount of increase.

(Prices f.o.b. Shipping Points)

Rayon Tire Cord

1100	lb.	.57
1650	lb.	.51
2200	lb.	.50

Nylon Tire Cord

840	lb.	.92
1680	lb.	.92

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.72
11.65 oz. (per square yard)	lb.	.66
14.4 oz. (per square yard)	lb.	.75

Liquid Latex

Natural: The Rubber Manufacturers Association reports that in the first eight months of the current year a total of 27,673 long tons of natural rubber latex were imported into the United States and 27,817 long tons were consumed. This compares with 37,585 long tons and 33,832 long tons, respectively, in the first eight months of last year.

With two-thirds of the year gone by it will be seen that consumption of natural rubber latex in the United States in 1961 will not readily rise above a 40-41,000 long ton level, or about 10,000 long tons less than in 1960. Some of the decrease, of course, can be accounted for by the general lassitude of the economy. Another portion of the decrease, however, must be attributed to the over-all loss of markets for natural latex.

Latex is currently selling at a 37-38c per pound level at East Coast ports in car load lots. Historically, this is an attractive price since it is below the "resistance point" of 40c. However, natural latex has been selling for less than 40c for the past few months and there has been no great increase in consumption.

Synthetic: In the first seven months of this year a total of 46,011 long tons of S-type latex were consumed in the United States against the 50,333 long tons consumed in the first seven months of 1960. Consumption of S-type latex in 1960 approximated 87,000 long tons, and in 1961 it will be at a 78-80,000 ton level.

Cotton

The price of middling uplands on the New York Cotton Exchange moved in the very narrow range of 30 points since our last report (September 1), high for the period being 35.50c reached on September 28 and 29, and low being 35.20c reached on September 1. The average price of middling uplands for the month of September was 35.36c based on 20 trading days. This compares with an average of 35.11c in August.

The United States Department of Agriculture reports that the 1961 yield of cotton is the smallest of the past four years. Disappearance of cotton in the 1961-62 marketing year probably will be about three-fourths of a million bales larger than production, estimated at 13.8 million running bales. The department expects that the cotton carryover on August 1, 1962 may be smaller than it was a year earlier, down to about 6.7 million bales; this is the smallest since 1953 and less than 50 per cent of the record high of 14.5 million bales in 1956.

Exports are also expected to decline by about 850,000 bales from the 6.6 million of 1960-61. On the other hand, mill consumption is expected to be up by half a million bales to about 8¾ million. Total disappearance is expected to be around 14.5 million bales, roughly 300,000 bales smaller than disappearance in 1960-61.

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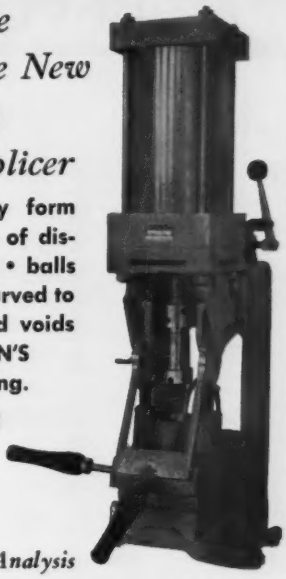

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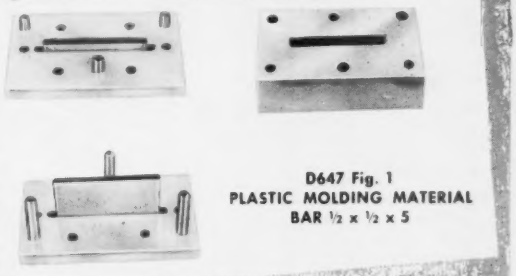

D647 Fig. 1
PLASTIC MOLDING MATERIAL
BAR ½ x ½ x 5

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MARKET PRICES

CHEMICALS & COMPOUNDING INGREDIENTS

OCTOBER 2, 1961

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

*Trademark. †For Export Only.

The arrangement of this section closely follows the Chemical Section of the 1961 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.74	.81
A-32*	lb.	.66	.80
A-100*	lb.	.52	.66
Accelerator No. 8*	lb.	—	1.25
Accelerator—49*	lb.	.60	.61
Accelerator 108*	lb.	—	.92
Accelerator—552*	lb.	—	2.25
Accelerator—808*	lb.	.66	.68
Accelerator—833*	lb.	1.17	1.19
Accelerator B*	lb.	—	.92
Altax*	lb.	.54	.56
Amax*	lb.	.75	.77
No. 1*	lb.	.71	.73
Ancap*(†)	lb.	.38	.40
Ancatax*(†)	lb.	.48	.50
Ancazate BU (ET & ME)*(†)	lb.	—	1.07
Ancazide ET*(†)	lb.	—	1.07
ME*(†)	lb.	—	1.14
Arazate*	lb.	—	2.25
Arquad 12*	lb.	.55	.61
Beutene*	lb.	.66	.68
Bismate, Rodform*	lb.	—	3.00
Butazate 50D*	lb.	.87	.89
Butyl Eight*	lb.	1.10	1.35
Butyl Namate	lb.	.45	.50
Captax*	lb.	.44	.46
C-P-B*	lb.	—	1.95
Cumate, Rodform*	lb.	—	1.45
Cydac*	lb.	.71	.73
Delac S*	lb.	.71	.73
DIBS*	lb.	—	.85
Diorthotolyguanidine	lb.	.69	.70
Dipac*	lb.	—	.85
Diphenylguanidine	lb.	.51	.52
Dithiocarbamates Cyzate B & E	lb.	.85	.89
El-Sixty*	lb.	.62	.69
Ethazate*	lb.	—	1.04
50D*	lb.	.87	.89
Ethyl Thurad*	lb.	—	1.04
Ethyl Tuex*	lb.	—	1.04
Ethylac*	lb.	.93	.95
Geigy Amines	lb.	.46	.52
Guantal*	lb.	.62	.69
Hepteen Base*	lb.	—	1.85
Kure-Blend MT*	lb.	—	.70
Ledate, Rodform*	lb.	—	1.04
MBT-XXX*	lb.	.55	.57
MBTS Grains*	lb.	.54	.56
Merac*	lb.	.75	1.05
Mercaptobenzothiazol	lb.	.44	.46
Mercaptobenzothiazyl Disulfide	lb.	.54	.56
Mertax*	lb.	.50	.57
Methazate*	lb.	—	1.04
Monex*	lb.	—	1.14
Mono Thurad*	lb.	—	1.14
2-MT	lb.	.88	.90
NA-22* (for neoprene)	lb.	—	1.05
NOBS No. 1*	lb.	.71	.73
Special*	lb.	.75	.77
O-X-A-F	lb.	.55	.57
Pennac SDB*	lb.	.45	.48
Pentex*	lb.	—	1.24
Flour*	lb.	—	.30
Permalux (Neoprene)*	lb.	—	2.25
Phenex*	lb.	.60	.65
Polyac*	lb.	—	1.85
R-2 Crystals*	lb.	—	4.35
Rotax*	lb.	.50	.52
RZ-50-A* and B*	lb.	.70	1.00
Santocure*; NS*	lb.	.71	.78
.26*	lb.	.75	.82
Selenac* (Ethyl, Methyl)	lb.	—	3.00
Seleram, Ethyl	lb.	—	3.00
Setsit-5*	lb.	.75	1.05
9*	lb.	.85	1.15
SPDX-GH*	lb.	.77	.79
GL*	lb.	1.20	1.30
Tellurac*	lb.	—	1.75
Tellurac Rodform (80%)	lb.	—	1.40
Tepidone*	lb.	.45	.45
Tetrone A*	lb.	—	1.98
Thiate A*	lb.	.88	—
B*	lb.	1.05	1.25
Thiazole ZMBT	lb.	.55	.57
Thiofide*	lb.	.54	.61
Thionex*	lb.	—	1.14
Thiotax*	lb.	.44	.51
Thiram, Ethyl	lb.	—	1.04
Methyl	lb.	—	1.14
Thiurad*	lb.	—	1.14
Thiuram E*	lb.	—	1.04
M*	lb.	—	1.14
Cyuram DS & MS	lb.	1.14	1.14
Trimene*	lb.	.56	.58
Base*	lb.	1.03	1.06
Triphenyl Guanidine	lb.	—	.90
Tuads* (Ethyl)	lb.	—	1.04
Tuads* (Methyl)	lb.	—	1.14
Tuex*	lb.	—	1.14
Ultex*	lb.	1.15	1.20
Unads*	lb.	—	1.14
Vulcacure NB*	lb.	.45	.45
NS*	lb.	.75	1.05
TMD*	lb.	—	1.14
ZB*, ZE*, ZM*	lb.	.85	.89
Z-B-X*	lb.	—	2.45
Zenite*	lb.	.54	.56
Zenite A*	lb.	.69	.71
Zenite AM*	lb.	.76	.78
Zenite Special*	lb.	.55	.57
Zetax* (uncoated)	lb.	.55	.57
Zimate* (Butyl)	lb.	—	1.04
Zimate* (Ethyl)	lb.	—	1.04
Zimate* (Methyl)	lb.	—	1.04
Zimate Slurry 50% solids content (Butyl, Ethyl & Methyl)	lb.	.85	.89
Ziram, Butyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Ethyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Methyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89

ACTIVATORS

Blue Lead Sublimed	lb.	.17	.18
Cottonseed Fatty Acids			
Drew Wecoline C*	lb.	.17¾	.19
Wochem 210* and 211*	lb.	.16	.18½
Fish Oil, Hydrogenated, Fatty Acid			
Century Hydrex 440	lb.	.09¾	.12¼
DAR-S*	lb.	.09¾	.12¼
DAR-HY*	lb.	.15½	.18
Groco 56*	lb.	.09¾	.12¼
Hydrofol Acids*	lb.	.11	.20½
Hyfac 430*	lb.	.16¼	.18¾
Neo-Fat H.F.O.*	lb.	.14½	.15¾
Neutrex*	lb.	.15	.17½
Stearite*	lb.	.11¾	.14¼
Talene*	lb.	.16¼	.18¾
Wecoline 200*	lb.	.14¾	.16
1000*, 1500*	lb.	.12	.13¼
Wochem 730*	lb.	.09¾	.12¼
731*	lb.	.15½	.18
732*	lb.	.16½	.19
Lime, Hydrated			
Arrowhead*	ton	—	21.00
Marblehead*	ton	—	19.25
Sierra*	ton	—	22.50
Litharge			
Eagle-Pitcher* (c.l.)	lb.	.13¾	—
National Lead*	lb.	—	.13¾
SB*	lb.	—	.18½

ACTIVATORS (Cont'd)

Magnesium Oxide, Heavy			
DCI 601*	lb.	.25¼	—
General Magnesite 500*	lb.	.05½	.06
600*	lb.	.06½	.07
Kaiser 325*	lb.	.03½	.06½
Michigan No. 15*	lb.	.05½	.06½
Morton's Magnesia	lb.	.25¼	—
Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼	.26
DCI Technical*	lb.	.21½	.23½
General Magnesite* (neoprene grade)	lb.	.26¼	.28¼
General Magnesite No. 101*	lb.	.24¾	.27¼
Genmeg MLW*	lb.	.25¼	.27¾
Light Calcined Magnesia			
No. X-01*	lb.	.25¼	.26
Maglite D*	lb.	.23½	.25
K* & Y*	lb.	.23½	.25
L*	lb.	.29¾	.30¾
M*	lb.	.27	.28½
Seamag*	lb.	.20	.20½
Marmag*	lb.	.24¾	.26
Michigan No. 30*	lb.	.24¼	.26½
Michigan 1782 Magnesia*	lb.	.25¼	.26½
Neomag Powder*	lb.	.29¼	.30
Pellets*	lb.	.31¼	.32
Oleic Acid			
Dar-Chem* 105	lb.	.17½	.20
Drew Wecoline OO*	lb.	.17¾	.19
Emersol 210*	lb.	.18	.20½
Groco Red Oil	lb.	.17½	.20
Neo-Fat 92-04*	lb.	.20½	.22½
94-04*	lb.	.18½	.20½
Wochem 310, 311	lb.	.17½	.20
Palm Fatty Acids			
Groco 45*	lb.	.16	.18½
Neo-Fat*	lb.	.15¾	.17¾
Wochem 280*	lb.	.15½	.18
281*	lb.	.16	.18½
Potassium Oleate (dms.)	lb.	.48	.73
Drew 24%*	lb.	.20	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.14¼	—
National Lead*	lb.	.14¼	.14¾
No. 2 RM*	lb.	—	.18½
Sodium Laurate, 75%	lb.	.64	.89
Sodium Oleate, 75%	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%	lb.	.47	.72
Stearic Acid, Single Pressed			
Century 1210*	lb.	.16¼	.17½
Dar-Chem 11*	lb.	.16¼	.18¾
Emersol 110*	lb.	.16¾	.19¼
Groco 53*	lb.	.16¼	.17½
Neo-Fat 18-53*	lb.	.14¾	.16¾
Stearic Acid, Double Pressed			
Century 1220*	lb.	.16¾	.18
Dar-Chem 12*	lb.	.16¾	.19¼
Emersol 120*	lb.	.17¼	.19¾
Groco 54*	lb.	.16¾	.18
Neo-Fat 18-54*	lb.	.15¼	.17¾
Stearic Acid, Other			
Century 1230*	lb.	.18½	.19¾
1240-Supra*	lb.	.18½	.19¾
Extra Pearlstearic*	lb.	.17½	.20
Neo-Fat 18*	lb.	.18½	.20½
18-58*	lb.	.14¼	.16¾
18-61*	lb.	.16¼	.18¼
Stearex*	lb.	.11¾	.13
Stearite*	lb.	.11¼	.13¼
Wecoline 300*	lb.	.15¼	.16½
Wochem 720*	lb.	.11¼	.13¾
721*	lb.	.11½	.14
White Lead Basic Carbonate	lb.	.18	.19
White Lead Basic Sulfate	lb.	.17	.18
Zinc Laurate			
Laurex*	lb.	.37	.39
Zinc Stearate	lb.	.41	.46
Aquazinc K.C.*	lb.	.30	.55
Crown Brand*	lb.	.39	.44

Unclassified Activators

Aktone*	lb.	.21¼	.23¼
Barak*	lb.	—	.65
Curade*	lb.	.57	.59
DCI Magnesium Carbonate*	lb.	.11	—
Dibenzo G-M-F	lb.	—	2.60
D-B-A*	lb.	—	1.95
G-M-F*	lb.	—	2.60
Dibutylamine (dlvd.)	lb.	.55½	.56½
MODX*	lb.	.38	.40
Neo Fat 42-07*	lb.	.10¼	.12¼
Ridacto* (dms.)	lb.	.25	.26
Snodotte* (dlvd.)	lb.	.18½	.21
Vimbra	lb.	.32	.38½
Vulklor*	lb.	.88	.98

ANTI-COAGULANTS

Aqua Ammonia* (dms.)	lb.	.031	.035
M.B.M.C.* (l.c.l.)	lb.	.54	.76

ANTI-FOAMING AGENTS

Aero Anti Foam H*	lb.	——	.20
Regular*	lb.	——	.12
Anhydrol 6991*	lb.	.51	.56
D.C. Antifoam A*	lb.	4.85	5.95
Antifoam A Emulsion*	lb.	1.78	2.58
Antifoam AF Emulsion*	lb.	1.78	2.58
Antifoam B*	lb.	.59	1.06
Defoama W-1701*	lb.	——	.12½
Defoamer A-25*	lb.	——	3.00
Defoamer 630*	lb.	——	.14
Deltyl Prime	lb.	.70	.80
Foamnix*	lb.	.60	1.50
G-E Antifoam SS-24*; 66*	lb.	5.28	6.65
60 Emulsion*	lb.	2.05	3.75
Igepol CO-210	lb.	——	.36
Kessco X-3* (dms.)	lb.	——	.39
X-180*	lb.	——	.28
X-181*	lb.	——	.36½
Nopco 1407*	lb.	.20½	.22½
1497-V*	lb.	.15¼	.17¼
1907-B*	lb.	.22½	.25
JMK*	lb.	.48½	.51
JMU*	lb.	.23¼	.25¾
JMY*	lb.	.23¼	.23½
NDW*	lb.	.21½	.24
Pluronic L61*	lb.	.33½	.39
RS-968*	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52½	.53½
UC SAG 47*	lb.	4.85	6.25
470*	lb.	.61	1.10
VL-520*	lb.	2.68	3.50

ANTIOXIDANTS

Agebest 1293-22A*	lb.	1.90	2.00
AgeRite Alba*	lb.	2.40	2.50
DPPD*	lb.	1.12	1.14
Gel*	lb.	.70	.72
Hipar*	lb.	1.05	1.07
H.P.*	lb.	.79	.81
ISO*	lb.	1.82	1.84
Powder*	lb.	.57	.59
Resin*	lb.	.88	.90
Resin D*	lb.	.57	.59
Spar*	lb.	.57	.59
Stalite & Stalite S*	lb.	.57	.59
Superflex*	lb.	.57	.59
Superlite*	lb.	.57	.59
White*	lb.	1.50	1.60
Akroflex C* Pellets	lb.	.85	.87
CD*	lb.	.79	.81
Aminox*	lb.	.57	.59
Antioxidant 425*	lb.	2.47	2.50
Antioxidant 2246*	lb.	1.50	1.53
Antox*	lb.	.59	.61
Aranox*	lb.	——	3.25
Betanox Special*	lb.	.94	.96
B-L-E*	lb.	.57	.59
Catalin CAO No. 1*	lb.	.57	.60
CAO No. 3*	lb.	.65	.68
CAO No. 5*	lb.	1.49	1.50
CAO No. 6*	lb.	——	3.50
Dalpac 4	lb.	.57	.60
Deenax*	lb.	.57	.60
Diphenylamine	lb.	.31	.33
Di-tert-Butyl-para-Cresol*	lb.	.86	1.16
DBPC*	lb.	.54	.60
Eugenol C-95%*	lb.	2.30	2.50
Flectol H*	lb.	.57	.64
Flexamine*	lb.	.79	.81
Ionol*	lb.	.57	.60
Naugawhite*	lb.	.57	.59
Powder*	lb.	.57	.59
Neozone A*	lb.	.64	.66
C*	lb.	.86	.88
D*	lb.	.57	.59
Nevastain A*	lb.	.51	.61
B*	lb.	.51	.70
Nullapon BF-12*	lb.	——	.21½
BF-13*	lb.	——	.25½
BF-78*	lb.	——	.55
BF-Acid*	lb.	——	.85
Octamine*	lb.	.57	.59
Oxidex*	lb.	——	3.60
PDA-10*	lb.	.46	.48
Pennox* A, B, C, D	lb.	.57	.72
Permalux*	lb.	——	2.25
Polygard*	lb.	.57	.59
Santoflex AW*	lb.	.71	.78
DD*	lb.	.57	.64
75*	lb.	1.01	1.08
Santovar-A*	lb.	1.55	1.62
Santowhite Crystals*	lb.	1.55	1.62
Santowhite L*	lb.	.57	.64
MK*	lb.	1.25	1.32
Powder*	lb.	1.55	1.62
Sequestrene AA*	lb.	.70	.80
NA2*	lb.	.59	.66
NA3T*	lb.	.54	.61
Sodium Nitrate	cwt.	8.75	11.00
Stabilite*	lb.	.57	.59
Alba*	lb.	.75	.80
FLX*	lb.	.78	.80
L*	lb.	.65	.67
White*	lb.	.57	.59
White Powder*	lb.	.46	.48
Stabilizer No. 1*	lb.	1.55	1.80
Stabilizer No. 9-A*	lb.	.80	1.05
Styphen I*	lb.	.51	.55
Sunolite*	lb.	.16	.22
Tecquinol*	lb.	.82½	.84½
Tenamene 3*	lb.	.57	.60
Thermoflex A*	lb.	1.05	1.07
Wing-Stay S*; T*	lb.	.56	.67
Zalba*	lb.	——	1.10
Special*	lb.	——	.85

ANTIOZONANTS

Eastozone 30 and 31*	lb.	.94	.99
Eastozone*; 32*	lb.	1.15	1.20
Flexzone 3C	lb.	——	2.00
6-H	lb.	1.25	1.27
Fura-Tone NC-1008*	lb.	.38	.39
NC-1012*	lb.	.46	.69
Santoflex AW*	lb.	.71	.78
UOP 88* & 288* (dms)	lb.	.95	.97
Wing-Stay 100*	lb.	1.00	1.08

ANTI-SCORCHING AGENTS

Akron Benzoic Acid	lb.	.41	.43
Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder PD*	lb.	.37	.39
W*	lb.	——	.46

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Irgason BS200*	lb.	2.50	2.75
Ortho Cresol (26°—27°)	lb.	.15	.16
Preventol GD	lb.	——	1.09
Retarder D*	lb.	.42	.50

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	4.70	5.80
Webnix 34-L*	lb.	1.25	1.75
57*; 69C*	lb.	1.50	2.00
71*	lb.	1.25	1.75

AROMATICS (DEODORANTS)

Airkem 115*	gal.	——	6.50
122*; 186*	gal.	——	6.50
Alamask AA*	lb.	——	3.00
AF*	lb.	——	2.50
AO*	lb.	——	1.50
AR*	lb.	——	.50
BG*	lb.	——	1.15
BGM*	lb.	——	.60
CY*	lb.	——	2.40
DJ*	lb.	——	3.35
DL*	lb.	——	1.95
H*	lb.	——	5.50
LD*	lb.	——	.75
ND*	lb.	——	2.75
O*	lb.	——	6.50
OS*	lb.	——	5.25
Bouquet 149*	lb.	——	3.00
Coumarin*	lb.	——	3.70
Deodorant 65*	lb.	——	1.85
Deodorant L-37*	lb.	2.15	2.25
L-44*	lb.	2.65	2.75
N.L.T.X.*	lb.	1.90	2.00
Deodorant Oil GD 6422*	lb.	1.90	2.20
GD 6423*	lb.	1.60	1.90
GD 6575*	lb.	2.40	2.90
GD 31063*	lb.	2.25	2.75
Ethavan*	lb.	6.20	6.25
Latex Perfume 17326	lb.	——	4.00
18301	lb.	——	3.00
22258	lb.	——	2.50
Naugaromes* (dms.)	lb.	.60	3.00
Neutroleum Delta*	lb.	——	2.25
Gamma*	lb.	——	3.25
Parador A*	lb.	1.80	2.10
C*	lb.	2.00	2.50
E*	lb.	.25	.40
GD 5280*	lb.	2.00	2.50
GD 53481*	lb.	1.70	2.00
Perfume Oil Bouquet Vanilla M*	lb.	1.60	1.70
Rodo No. 0*	lb.	4.00	4.50
No. 10*	lb.	5.00	5.50
Rubbarome* (dms.)	lb.	.60	3.80
Rubber Perfume 12*	lb.	——	4.35
Russian Leather 7*	lb.	——	4.35
Vanillin	lb.	2.75	2.80

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	9.00
Better Blend Soda* (c.l., bags)	cwt.	——	2.70
B-I-K	lb.	.20	.22
Blowing Agent No. 81105*	lb.	.32	.35
Celogen*	lb.	——	1.95
AZ*	lb.	1.92	1.94
80	lb.	——	1.60
Diazo Amino Benzene	lb.	——	.73
Kempore R-125	lb.	——	1.92
Neo Fat 42-12*	lb.	.10¼	.12¼
Opex 40	lb.	——	.72
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	2.55
Unicel ND*	lb.	——	.72
S*	lb.	——	.20
Urea	lb.	.06	.07

BONDING AGENTS

Base 6986*	lb.	.27	.32
Braze*	gal.	6.00	9.00
Braze Cover Cement*	gal.	2.50	4.00
Chemlock 201 and 203*	gal.	5.00	7.50
220*	gal.	8.95	12.00
607*	gal.	15.00	24.00
EX-B501-4*	gal.	6.20	9.40
EX-B150-1*	gal.	8.15	11.00
EX-B579-1*	gal.	19.40	26.00

BONDING AGENTS (Cont'd)

Durez 12987*	lb.	.47½	.49
Gen-Tac Latex*	lb.	.70	.75
Hylene M*	lb.	1.25	1.50
M-50*	lb.	.86	1.11
Penacolite B1A*	lb.	——	.95
R-2710*	lb.	——	.95
Pliobond 20*	gal.	2.91	4.23
30*	gal.	3.65	4.97
Rex Compounds*	gal.	1.30	1.90
Thixons*	gal.	2.95	9.80
Ty-Ply Q (BN & S)*	gal.	6.75	8.00
Tygobond 30*	gal.	4.10	5.40
40*	gal.	5.80	6.89
41*	gal.	8.65	9.85
45*	gal.	5.75	6.48
Vinculux	gal.	——	4.95

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Flake	lb.	.07½	.09½
Hydroxyacetic Acid—70% (dms.)	lb.	——	.09½
Zinc Nitrate, Tech. Flake	lb.	——	.20

COLORING AGENTS

Black

Aquablak B*	lb.	.09¾	.10¾
M*	lb.	.10½	.11
S*	lb.	.11¾	.12¼
Black Shield 4*	lb.	.10	.10½
No. 6	lb.	.11	.11½
No. 17	lb.	.12½	.13
No. 19	lb.	.12	.12½
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10*	lb.	.06	.09
Mapico Black Iron Oxide* (50 lb. bags)	lb.	.14¾	.15
Pure Black Iron Oxide	lb.	.14¾	.15

Blue

Akron Masterbatches*	lb.	2.23	2.78
Toners*	lb.	2.30	6.35
Blue Powders	lb.	2.20	3.75
Cooke M.B. Blue* 426	lb.	2.20	3.75
Cyan Blue GT 55-3295	lb.	——	3.20
XR 55-3760	lb.	——	2.90
XR 55-3770	lb.	——	3.25
Disco Blues	lb.	2.20	3.45
Harmon Blue Toner B-4776	lb.	——	2.90
Monastral Rubber Blue CPL*	lb.	1.95	1.95
PCD, Dispersed*	lb.	——	2.55
Peacoline Blue*	lb.	——	3.85
Ramapo Blue*	lb.	2.75	3.00
Rubber Blue GD* (Disp.)	lb.	——	4.75
Rubber Blue X-1999*	lb.	——	1.90
Rubber Dispersed Blues	lb.	2.52	2.78
Solfast Blue*	lb.	1.60	25
Stan-Tone MBS*	lb.	2.20	. 92
GPE*	lb.	2.25	2.75
PEC*	lb.	1.95	2.10
Ultramarine	lb.	.14	.30
Vansul Blue M.B.*	lb.	1.00	2.70

Brown

Brown Iron Oxide	lb.	.15¾	.16
Mapico Brown* (50 lb. bags)	lb.	.15¾	.16
Stan-Tone GPE*	lb.	——	3.00
Vansul Brown M.B.* (Organic)	lb.	——	2.30

Green

Akron Masterbatches*	lb.	1.53	3.08
Toners*	lb.	1.50	4.35
Chromium Oxide	lb.	.44½	.45¼
Cooke M.B. Green*	lb.	1.60	2.80
413*	lb.	——	2.80
Cyan Green 15-3100	lb.	——	3.35
Disco Greens	lb.	1.55	2.80
Green Powders	lb.	1.35	3.95
Harmon Green Toner G-5056	lb.	——	3.95
Hi-Fiz Fluorescent	lb.	1.60	2.60
Monastral Rubber Green GSD* (Dispersed)	lb.	——	2.80
GSL*	lb.	2.20	2.20
Permansa Green CP-1236*	lb.	——	1.45
Pigment Green B*	lb.	1.45	1.50
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	——	3.50
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD* (Disp.)	lb.	——	2.05
Rubber Green X-1292*	lb.	——	1.75
Serene Green*	lb.	——	3.50
Solfast Green*	lb.	1.60	3.35
Stan-Tone MBS*	lb.	2.50	3.42
GPE*	lb.	1.50	1.70
PC*	lb.	2.20	2.25
Vansul Green M.B.*	lb.	1.50	2.75

Maroon

Akron Masterbatches*	lb.	3.53	4.38
Toners*	lb.	.98	5.60
Harmon Maroon Toner MV-6606	lb.	——	5.75
Pyrolux Maroon*	lb.	——	3.40
Vansul Maroon M.B.*	lb.	——	4.05

COLORING AGENTS (Cont'd)

Orange

Akron Masterbatches*	lb.	2.53	2.98
Toners*	lb.	2.97	4.30
Benzidene Orange	lb.	—	3.30
Cooke MB*	lb.	2.25	2.35
425*	lb.	—	2.25
Dianisidine Orange*	lb.	—	2.85
Disco Oranges	lb.	2.30	2.85
Harmon Diane Orange Toner Y-25	lb.	—	2.85
Pyrazolone Orange Toner YB-3	lb.	—	3.30
Hi-Fiz Fluorescent	lb.	1.40	2.40
Mercadium X-2667*	lb.	—	1.73
Molybdate Orange	lb.	—	.49
Oswego Orange X-2065*	lb.	—	3.30
Rubber Orange OD* (Disp.)	lb	—	2.25
Stan-Tone Cadmium Dry*	lb.	1.85	4.28
Cadmium Paste*	lb.	2.43	2.85
GPE*	lb.	1.05	1.20
PC*	lb.	.75	.80
Vansul Orange M.B.*	lb.	2.30	2.65

Red

Akron Masterbatches*	lb.	1.30	3.68
Toners*	lb.	.98	5.60
Arcturus Reds*	lb.	—	1.35
Antimony Trisulfide	lb.	.72	.78
R.M.P. Sulfur Free*	lb.	—	.78
R.M.P. No. 3*	lb.	—	.72
Bonadur 20-6440	lb.	—	1.90
20-6540	lb.	—	2.00
Brilliant Toning Reds*	lb.	1.77	1.90
Cadmolith Red* (dms.)	lb.	1.94	2.87
Clarion 20-7150	lb.	—	1.35
Cooke M.B. Red*	lb.	1.05	3.25
410*	lb.	—	1.75
Disco Reds	lb.	1.05	3.25
Graphic Red* (dlvd.)	lb.	.98	1.03
Harmon Electra Red Toner	lb.	—	3.45
Lithol Rubine Toner R-6142	lb.	—	1.60
Pyrazolone Red Toner	lb.	—	1.40
Rincon Red Tones	lb.	—	1.90
Hi-Fiz Fluorescent	lb.	1.15	2.15
Kroma Reds*	lb.	.14¼	.14½
Lake Red C*	lb.	—	1.25
Mapico Reds* (50 lb. bags)	lb.	.14¼	.14½
Mercadium X-2668 Light*	lb.	—	1.80
X-2669 Medium Light*	lb.	—	1.88
X-2670 Medium*	lb.	—	1.95
X-2671 Dark*	lb.	—	2.03
Naphthol 20-7575	lb.	—	3.80
Oximony Red Iron Oxide	lb.	.14¼	.14½
Plasticone Red*	lb.	1.02	4.60
Polaris Red*	lb.	—	1.70
Recco Red Oxide*	lb.	.13½	.13¾
Red Iron Oxide, Light	lb.	.14¼	.14½
Red Powders	lb.	—	4.40
Rubber Dispersed Reds	lb.	1.47	3.58
Rubber Red PBD* (Disp.)	lb.	—	2.05
2BD, Dispersed*	lb.	—	2.00
2BL*	lb.	1.24	1.24
PBL*	lb.	1.24	1.24
Rubanox Reds*	lb.	1.47	1.60
Rubber Red CP-339* (dlvd.)	lb.	—	1.10
Rubber Red X-1148*	lb.	—	.98
Solfast Red*	lb.	1.47	1.80
Stan-Tone MBS*	lb.	1.00	3.75
GPE*	lb.	.70	3.05
PC*	lb.	1.10	1.45
Vansul Red M.B.*	lb.	1.00	3.35
Watchung Red*	lb.	1.90	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.23¼	.23½
20* (50 lb. bags)	lb.	.23¼	.23½

White—Lithopone

Permolith*	lb.	.0825	.09125
Sunolith*	lb.	.0800	.0875

White—Titanium Pigments

Iceberg*	lb.	—	.0265
Icecap K*	lb.	—	.03¼
Horse Head Anatase Grades*	lb.	.25	.26½
Rutile Grades*	lb.	.27	.28½
Stan-Tone PC*	lb.	.55	.60
Ti-Cal* R-22*, R-25*, R-27*	lb.	.09⅛	.09⅜
R-60*	lb.	.09⅜	.10⅛
Ti-Pure* Anatase Grades*	lb.	.25	.26
Rutile Grades	lb.	.27	.28
Titanox A*—all grades (dlvd.)	lb.	.25½	.26½
C-50* (dlvd.)	lb.	.14¾	.14⅞
RA* (dlvd.)	lb.	.27½	.28½
RA-10* (dlvd.)	lb.	.27½	.28½
RA-NC* (dlvd.)	lb.	.27½	.28½
RC* (dlvd.)	lb.	.09¾	.10⅛
RC-HT* (dlvd.)	lb.	.09⅜	.09¾

COLORING AGENTS (Cont'd)

White—Titanium Pigments (Cont'd)

Unitane O-110*	lb.	.25½	26½
O-220*	lb.	.25½	.26½
O-310*	lb.	.25½	.26½
OR-150*	lb.	.27½	.28½
OR-250*	lb.	.27½	.28½
OR-340*	lb.	.27½	.28½
OR-342*	lb.	.27½	.28½
OR-350*	lb.	.27½	.28½
OR-540*	lb.	.27½	.28½
OR-640*	lb.	.27½	.28½
Zopaque*	lb.	.24½	.25½
R*	lb.	.26½	.27½

White—Zinc Oxide (American Process)

AZODOX 44, 45	lb.	.1250	.1350
AZO-ZZZ 11*, 22*, 33*, 44* 55*	lb.	.1250	.1350
Eagle-Picher AAA*	lb.	.1450	.1550
Horse Head Special*	lb.	.1450	.1550
XX*	lb.	.1450	.1550
Protox 166*	lb.	.1450	.1550
167*	lb.	.1450	.1550
267* (pelleted)	lb.	.1450	.1550
St. Joe Black Label* 20, 20-21	lb.	.1450	.1550
Red Label* 30, 31	lb.	.1450	.1550
Green Label* 12, 46 (latex only)	lb.	.1450	.1550
Green Label* 42, 42-21, 42A-3, 43 Pelets	lb.	.1450	.1550

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1250	.1350
Florence Green Seal*	lb.	.1450	.1550
Red Seal*	lb.	.1450	.1550
White Seal*	lb.	.1475	.1575
Kadox 25*	lb.	.1350	.1450
15*, 17*, 72* & 515	lb.	.1300	.1400
Protox 168*	lb.	.1450	.1550
169*	lb.	.1450	.1550
268* (pelleted)	lb.	.1450	.1550
U.S.P. (cartons)	lb.	.1600	.1700
XX-78*	lb.	.1450	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530	.2630
Lehigh 12%*	lb.	.1250	.1350
18%*	lb.	.1400	.1500
35%*	lb.	.15375	.16375
50%*	lb.	.1575	.1675

Yellow

Akron Masterbatch*	lb.	1.27	2.48
Toners*	lb.	2.20	6.00
Benzidene-Lightfast	lb.	3.40	5.35
Benzidine Yellow	lb.	1.41	2.55
Cadmolith Yellow (dms.)	lb.	—	1.19
Chrome Yellow	lb.	.35	.35
Cooke M.B. Yellow 405*	lb.	2.15	2.75
Disco Yellows	lb.	2.05	3.95
Harmon Benzidene Yellow Toner YB-2	lb.	—	2.25
Fanchon Yellow Toner	lb.	—	2.20
Hi-Fiz Fluorescent	lb.	1.60	2.60
Iron Oxide, Pure Light Shades	lb.	.12½	.12¾
Dark Shades	lb.	.12	.12¼
Mapico Yellow* (50 lb. bags)	lb.	.12	.12¼
Rubber Dispersed Yellows	lb.	1.27	2.13
Rubber Yellow GD* (disp.)	lb.	—	2.25
GL*	lb.	—	1.68
Rubber Yellow X-1940*	lb.	—	2.55
Stan-Tone Cadmium Dry*	lb.	2.80	3.03
Cadmium Paste	lb.	1.72	1.82
MBS*	lb.	1.30	2.20
GPE*	lb.	.70	3.25
PC*	lb.	.55	3.50
Toluidine Yellow	lb.	2.20	2.20
YL-660 D*	lb.	1.25	1.35
Oximony Iron Oxide	lb.	.14¼	.14½
Vansul Yellow M.B.*	lb.	1.15	2.15
Yellow Powders	lb.	2.00	5.00
Zinc Yellow	lb.	.29	.29

DISPERSING AGENTS

Anchoid*(†)	lb.	.24	.25
Anhydrapent*	lb.	.56	.59
Armeen 18*	lb.	.39	.45
Belloid TD*	lb.	.15¾	.16¼
Blancol*	lb.	—	.15¼
Darvan No. 1*	lb.	.25¼	.38½
No. 2*; No. 3*	lb.	.23¾	.36¾
No. 6*	lb.	.18½	.19
No. 7*	lb.	.26¼	.36¼
Daxad 11* (21*, 23*)	lb.	.08	.30
Diethanolamine (dms., dlvd.)	lb.	.24½	.27
Dispersaid*	lb.	1.25	1.35
Emcol K-8300* (dms.)	lb.	.14	.18
P10-59	lb.	.32	—
5120	lb.	.31	—
5138	lb.	.31	—
Emulphor ON-870*	lb.	—	.55
Furala*	lb.	.06½	.07½
Halloid*	lb.	.04½	.05½
Igepal CO-630*	lb.	—	.29
Igepon T-73*	lb.	—	.29½
Kyro EO* (dms.)	lb.	—	.29¾
Leonil SA*	lb.	—	.55

DISPERSING AGENTS (Cont'd)

Lipal No. 9N*; 11-O*	lb.	.28	.29
Lomar PW*	lb.	.15¼	.15¾
Marasperse C*	lb.	.06¾	.06¾
CB*	lb.	.15	.17
N*	lb.	.09½	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25	.27½
Naccosol A (dlvd.)	lb.	—	.52
Naccotan A*	lb.	.16½	.17
Nekal BA-75*	lb.	—	.40
BX-78*	lb.	—	.64
Nopcosant*	lb.	.15¼	.15¾
Pluronic F68*	lb.	.38½	.44
Polyfon*	lb.	.08	.10
R & R 551*	lb.	—	.28
Stablex B*	lb.	.50	.95
Stan-Chem BQC*	lb.	.12¼	.17¾
1067*	lb.	—	.13½
1471*	lb.	.1687	.2187
2251*	lb.	.12¼	.17¾
Trenamine D-25*	lb.	.32½	.36
Triethanolamine (dms., dlvd.)	lb.	.22	.25½
Yelkin TT* (and TTS*)	lb.	.13	.16

EXTENDERS

Arcco 1294-36B*	lb.	.11½	.12½
Car-Bel-Ex-A*	lb.	—	.144
Extender 600*	lb.	—	.1870
Facile Gum 4A*	lb.	.48	.50
Millex*; W*	lb.	—	.07
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
Polyco 418*	lb.	.17	.18
PR-162 Latex Extender*	lb.	—	.182
Solvitose HDF*	lb.	.22	.25
Synprolac*	lb.	.16	.23
Synprowax*	lb.	—	.23
Vanadiset B*	lb.	.0360	.07
C*	lb.	.0310	.06
MR* 80 mesh	lb.	.08½	.12½
Vistanex MM Grades*	lb.	.35	.37½
Wilcarbo Carbon Powders*	lb.	.08	.15

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite*	lb.	.21½	1.35
Lionite*	lb.	.16	1.27
Pumice	lb.	.03	.05
Walnut Shell Grits	ton	60.00	110.00
Aluminum Hydrate	lb.	.031	.170
Kaiser Aluminum Hydrate*	lb.	.035	.065
Aluminum Silicate			
AFD*	ton	29.50	36.00
Alumlnum Flake*	ton	29.50	36.00
Marter White*	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	109.00	126.50
Barytes			
No. 1 Floated, White*	ton	55.00	79.85
No. 2 Floated, Unbleached*	ton	50.00	74.85
No. 22 Barytes* (c.l.)	ton	—	30.00
No. 3805 Barytes*	ton	22.00	26.75
Foam A*	ton	60.00	84.85
Sparmite*	ton	80.00	90.00
XIOR*	ton	90.00	95.00
Bentonite (c.l.)	ton	—	13.50
Argosite Clay* (c.l.)	ton	—	12.50
Bennett Clay* (c.l.)	ton	—	32.50
SPV Volclay* (c.l.)	ton	—	13.50
White Hi-Gel*	ton	—	65.90
Blanc Fixe	ton	125.00	142.00
Calcium Carbonate			
Allied Whiting	ton	—	11.50
Atomite* (c.l.)	ton	32.50	35.00
B.I. White No. 1 (c.l. ton		—	10.00
Calcene NC*	ton	80.00	100.00
TM*	ton	82.50	102.50
Calwhite*	ton	20.00	25.00
T*	ton	25.00	30.00
Camel-Carb*	ton	—	14.00
Camel-Tex*	ton	—	22.00
Camel-Wite*	ton	—	35.00
Carbium	ton	30.00	40.00
CCC "G"	ton	15.00	17.00
CCC No. 1*	ton	10.50	12.50
CCO White*	ton	—	22.00
Duramite*	ton	20.00	22.00
Gamaco* (c.l.)	ton	32.50	37.50
T*	ton	37.50	42.50
GamaKal*	ton	37.50	42.50
Georgia Marble 5-25* (c.l.)	ton	—	20.00
No. 10 White* (c.l.)	ton	—	11.00
Kalite*	ton	52.50	67.50
Kalmac*	ton	23.00	28.00
Laminar*	ton	—	30.00
Lesamite* (c.l.)	ton	—	27.50
Lorite*	ton	30.00	36.00
Millical*	ton	38.00	53.00
Multifex MM*	ton	117.50	137.50
Non-Fer-Al*	ton	35.00	50.00
Purecal M*	ton	65.00	85.00
SC* (and T*)	ton	117.50	137.50
U*	ton	127.50	147.50
PPTD* (c.l.)	ton	—	30.00
Rambo No. 1*	ton	—	11.50
Snowflake*	ton	20.00	22.00
Super Multifex*	ton	167.50	187.50
Surfex*	ton	42.00	57.00
Suspenso*	ton	38.00	43.00
Witcarb Reg.*	ton	60.00	85.00
R*	ton	127.50	150.00
RC*	ton	117.50	140.00
York White*	ton	—	11.50

POLYSAR SS 260

a new high in reinforcement . . . a new plus in soling

For applications requiring reinforcing, low gravity and ease of processing, Polymer Corporation now offers Polysar SS-260, an elastomer with a new high degree of self-reinforcement.

Polysar SS-260 is in free-flowing, easily processed, dust free flake form—pure white, non-discoloring and non-staining.

Polysar SS-260 offers worthwhile advantages in the manufacture of high quality nuclear soling, medium quality nuclear soling and work boot soling. For oil-resistant soling, Polysar SS-260 can be used in blends with Polysar Krynacs to give greater oil resistance than previously available, at equivalent vulcanizate hardness.

Write for Polysar Technical Report No. 9: 9A to Marketing Division, Polymer Corporation Limited, Sarnia, Canada.

*Trade Mark Reg'd.

POLYSAR

SARNIA CANADA

ONE OF THE WORLD'S MAJOR SOURCES OF RUBBER

DISTRIBUTOR: H. MUEHLSTEIN & Co. Inc., 521 FIFTH AVENUE, NEW YORK 17, N.Y., U.S.A.

...extends
a range of
3 self-reinforcing elastomers
for the hardness and flex life
you require

Polysar SS-260 is a white, non-staining copolymer of butadiene and styrene which exhibits a higher degree of self-reinforcement than Polysar SS-250. Polysar SS-260 has the following general properties:

Monomers	Butadiene and styrene
Polymerization system	Cold
Stabilizer type	Non-staining
Coagulant	Brine-acid
Emulsifier	Fatty acid
Total ash (%)	0.97
Volatile matter (%)	0.20
Specific gravity	0.97
Form	Flake

Polysar SS 260
extends the range
of self-reinforcing elastomers
manufactured by Polymer Corporation.
With Polysar SS 260,
Polysar SS 250 and Polysar Kryflex 252
there is now a Polysar rubber
to provide the exact degree
of hardness and flex life
demanded by the application.

There's a Polysar* rubber for every purpose... General Purpose Rubbers —Butadiene-Styrene Copolymers; Oil Resistant Rubbers—Butadiene-Acrylonitrile Copolymers; Special Purpose Rubbers—Butadiene-Styrene Copolymers; Butyl Rubbers —Isobutylene-IsopreneCopolymers; and Latices.

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DISTRIBUTORS IN
MEXICO • BRAZIL • ARGENTINA • CHILE

FILLERS (Cont'd)

Calcium Silicate			
Silene EF*	lb.	.06	- .06½
Calcium Sulfate, Anhydrous			
Snow White Filler*	ton	—	- 22.00
Calcium Sulfate Hydrous			
Terra Alba No. 1*	ton	—	- 17.00
Chalk Whiting (l.c.l.)	lb.	.01½	- .01¾
Recco Paris Whiting*	ton	—	- 35.00
OMYA Whiting*	ton	—	- 35.00
Clay			
Afton Clay*	ton	13.00	- 38.00
Aiken Clay*	ton	14.50	- —
Akron HC-100*	ton	14.50	- —
HC-75*	ton	13.00	- —
SC-25*	ton	14.50	- —
Alsilite* (c.l.)	ton	30.00	- 45.00
Aluminum Flake*	ton	25.50	- 28.50
Barden R*	ton	7.50	- 12.00
Buca* (c.l.)	ton	—	- 45.00
Burgess No. 20*	ton	—	- 33.00
No. 30*	ton	—	- 40.00
Burgess Iceberg*	ton	—	- 53.00
Icecap K*	ton	—	- 65.00
Catalpo* (c.l.)	ton	33.00	- —
Champion*	ton	—	- 14.50
Crown*	ton	—	- 14.50
Dixie* (c.l.)	ton	—	- 14.50
Dover*	ton	—	- 13.00
Franklin Clay—R* (c.l.)	ton	16.00	- 41.50
G. K. Soft*	ton	11.50	- 32.00
Glomax HE (bags)	ton	65.00	- —
LL (bags)	ton	53.00	- —
PVR (bags)	ton	40.00	- —
WZ (bags)	ton	45.00	- —
Harwick Clays*	ton	21.50	- 77.00
Hydrite RS (bags)	ton	30.00	- —
PXS (bags)	ton	45.00	- —
UF (bags)	ton	100.00	- —
10S (bags)	ton	50.00	- —
Flat "D" (bags)	ton	25.00	- —
Hi-White R*	ton	10.00	- 14.50
Kaolloid Clay* (c.l.)	ton	—	- 10.50
LGB*	ton	13.00	- 17.50
LGP*	ton	15.50	- 20.00
McNamee* (c.l.)	ton	—	- 14.50
Natka 1200	ton	12.00	- 35.00
Par* (c.l.)	ton	—	- 12.00
Paragon*	ton	10.00	- 14.50
Pigment 5*	ton	27.50	- 34.50
33*	ton	—	- 40.00
Polyfil 40	ton	40.00	- —
70	ton	53.00	- —
80	ton	65.00	- —
C	ton	25.00	- —
F	ton	45.00	- —
X	ton	30.00	- —
Recco* (c.l.)	ton	—	- 14.50
Swanee Clay*	ton	—	- 12.50
Snobrite*	ton	—	- 12.50
Suprex*	ton	10.00	- 14.50
Whitetex* (c.l.)	ton	53.00	- —
Windsor*	ton	14.50	- 39.50
4200 Clay*	ton	13.00	- —
Diatomaceous Earth	ton	30.00	- 50.00
Celatom MN-33	ton	36.00	- 95.00
MP-25	ton	55.00	-121.00
MP-63	ton	55.00	-121.00
Celite 270	ton	55.00	-121.00
292	ton	36.00	- 95.00
315; 350	ton	137.00	-225.00
Kaylorite* (c.l.)	ton	—	- 30.00
Lorite*	ton	—	- 36.00
Flock			
Cotton (White)	lb.	.28	- .30
Colored	lb.	.12	- .20
Filfloc F 40-9000*	lb.	—	- .13
F 6000*	lb.	—	- .36
Nylon	lb.	—	- .35
Polycel*	ton	110.00	-210.00
Rayon, Bleached or Dyed	lb.	.75	- 1.20
Rayon, Grey	lb.	—	- .18
Rayon, Pink	lb.	—	- .20
Solka-Floc* (l.c.l.)	lb.	.07	- .16
Glue, Amber	lb.	.17	- .19
Ground Softwood Bark			
Silvacon* (c.l.)	ton	55.00	-100.00
Leather			
Flour (dust)	lb.	.12	- .15
Shredded	lb.	.03	- .17
Lignin	lb.	.06	- .08
Limestone, Pulverized	ton	3.00	- 5.00
Asbestol Regular*	ton	28.00	- —
Asbestol Superfine*	ton	33.00	- —
Georgia Marble No. 10*	ton	—	- 11.00
Industrial Filler No. 100*	ton	—	- 7.75
Micro Velva A*	ton	53.00	- —
L*	ton	61.00	- —
No. 1 White*	ton	—	- 11.00
Magnesium Carbonate	lb.	.10½	- .13
Magcarb L*	lb.	.11	- .13
Michigan*	lb.	.11	- .15
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼	- .07¼
Concord*	lb.	.08	- .08¾
Micro-Mica*	lb.	.08	- .08¾
Mineralite* (c.l.)	ton	40.00	- 85.00
Silversheen*	lb.	.08	- .08¾
Triple A Mica* (c.l.)	ton	—	- 40.00
Vermiculite*	lb.	—	- .11
Wet Ground Biotite			
Mica	lb.	.06½	- .07¼
Wet Ground Mica No.			
160*	lb.	.08	- .08¾

FILLERS (Cont'd)

Pecan Shell Flour			
Stan Shell*	ton	45.00	75.00
Pyrophyllite			
No. 261*	ton	—	- 11.50
Pyrax A* (c.l.)	ton	14.50	- 15.00
WA* (c.l.)	ton	17.00	- 17.50
Sawdust, Graded	ton	14.00	- 35.00
Silica	ton	16.00	- 27.00
Extra Fine (bags) (c.l.)	ton	—	- 43.00
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Lo-Micron Slate Flour*	lb.	—	- .04½
No. 133 Slate Flour*	ton	—	- 4.55
Sodium Silico Aluminate			
Zeolex 23*	lb.	.06	- .07
Talc (Magnesium Silicate)			
Akron Soapstone*	ton	—	- 9.75
Asbestol Regular*	ton	—	- 27.00
Eastern RC-500*	ton	—	- 32.00
No. 41*	ton	—	- 19.70
No. 549*	ton	—	- 63.00
French*	ton	—	- 59.00
No. 367*	ton	—	- 13.00
No. 1600*	ton	—	- 70.60
No. 1768*	ton	—	- 13.00
Nytal 200* (c.l.)	ton	—	- 28.00
300* (c.l.)	ton	—	- 38.00
Sierra Fibrene C-400*	ton	34.00	- 40.00
Sierra Supreme 325*	ton	51.00	- 56.00
Sierra White*	ton	21.75	- 26.75
Soapstone*	ton	—	- 13.00
Walnut Shell Flour	ton	55.00	-100.00
Agrashell*	ton	55.00	-115.00
Stan-Shell*	ton	50.00	-110.00
Whiting, Commercial	ton	—	- 7.50
Allied Whiting*	ton	—	- 11.50
Camel-Carb*	ton	—	- 10.00
Calwhite (c.l.)	ton	—	- 20.00
C-C-O White*	ton	—	- 22.00
Georgia Marble No. 15*	ton	—	- 20.00
No. 16*	ton	—	- 20.00
Piqua No. 1 YAA* (c.l.)	ton	10.00	- 10.00
No. 2 LS* (c.l.)	ton	10.00	- 10.00
Snowflake* (c.l.)	ton	20.00	- 22.00
Stan-White 325*	ton	11.50	- 14.10
Ultrasil*	lb.	.35	- .50
Veroc* (c.l.)	ton	—	- 11.50
Welco* (c.l.)	ton	—	- 10.50
York White R* (c.l)	ton	—	- 11.00
Wood Flour	ton	31.50	- 48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes*	gal.	2.10	- 2.35
Black Out*	gal.	4.50	- 8.00
Calcium Hypochlorite (dms.) (cwt.)	ton	33.30	- 37.90
Shellac, Orange Gum	lb.	.35	- .45
VanWax*	gal.	2.00	- 2.05

FLAME RETARDANTS

Cellufiex CEF* (dms.)	lb.	—	- .65
Chlorowax 40*	lb.	.15	- .17½
50*	lb.	.16	- .18½
70*	lb.	.18½	- .20
Halowax*	lb.	.36	- .46
Zinc Borate 3167*	lb.	.1920	- .2020
Zyrox Compounds*	lb.	.38	- .95½

LATEX MODIFIERS

Crux*	lb.	.30	- .65
Foamnix*	lb.	.60	- 1.50
Ludox	lb.	.15	- .16¾
Nopco EB*	lb.	.16¾	- .18¾
EB-1*	lb.	.16¾	- .18¾
EB-5*	lb.	.19½	- .21½
OPD-101*	lb.	.29	- .40
Piccopale A-1 Emulsion	lb.	.086	- .113
A-20	lb.	.089	- .116
A-22	lb.	.097	- .124
A-41; A-43	lb.	.0775	- .0145
C-1	lb.	.091	- .118
N-3	lb.	.100	- .127
STAYB*	lb.	.25	- .45
Syton 200	lb.	.15	- .16¼
Ubatol U-2001* (t.c.)	lb.	.166	- .187
U-2003* (t.c.)	lb.	.184	- .208
U-2007* (t.c.)	lb.	.166	- .187
U-3025* (c.l.)	lb.	.223	- .235
U-3040* (c.l.)	lb.	.260	- .272
U-3045* (c.l.)	lb.	.260	- .272
U-3050* (c.l.)	lb.	.195	- .207
Webnix*	lb.	1.25	- 2.00

LUBRICANTS, MOLD

Akro Gel*	lb.	—	- .165
Alipal CO-433*	lb.	—	- .20
CO-436*	lb.	—	- .24
Aluminum Stearate Crown Brand*	lb.	.37	- .42
Amine, Mixed Crude*	lb.	.19	- .25
Aquadag*	lb.	3.50	- 4.00
Aquarex D*	lb.	—	- .81
L*	lb.	—	- .94
ME*	lb.	—	- .82
MDL*	lb.	—	- .33
WAQ*	lb.	—	- .22
Armeen HT*	lb.	.34	- .40
180*	lb.	.52	- .56
Armid HT (flaked)*	lb.	.42	- .46
0*	lb.	.39	- .41
Borax Granular (l.c.l.)	ton	89.00	- 94.00

LUBRICANTS, MOLD (Cont'd)

Carbowax 4000*	lb.	.31	- .32
CD Mold Release B*	gal.	5.00	- —
B-2*	gal.	5.00	- —
Colite Concentrate* (dms.)	gal.	.90	- 1.15
Colite D43D*	gal.	1.15	- 1.40
Concentrex*	lb.	—	- .25
Dag Dispersion No. 197*	lb.	1.95	- 2.90
D.C. 7 Compound*	lb.	4.70	- 5.80
D.C. Emulsion No. 7*	lb.	1.59	- 2.07
No. 8*	lb.	1.15	- 1.69
No. 35*; 35A*	lb.	1.15	- 1.69
No. 35B*	lb.	1.15	- 1.69
No. 36*	lb.	1.15	- 1.69
D.C. Mold Release Fluid*	lb.	2.90	- 3.47
Dri-Lube*	lb.	—	- .22
Dry-Flo* (50 lb. bags)	lb.	21.40	- —
Emulsion Lubricant A80*	lb.	—	- 1.20
45*	lb.	—	- 1.20
G-E Silicone Emulsion SM-55*	lb.	1.15	- 1.69
SM-61*	lb.	1.15	- 1.69
SM-62*	lb.	1.15	- 1.69
G-E Silicone Fluid SF-92*	lb.	2.90	- 4.05
SF-96*	lb.	2.90	- 4.05
Hawkeye Flake* (dlvd.)	lb.	.11½	- .13¾
Igepal CO-430*	lb.	—	- .29
CO-630*	lb.	—	- .29
CO-530*	lb.	—	- .29
Igepon AP-78*	lb.	—	- .48
T-33*	lb.	—	- .21
T-51*	lb.	—	- .13½
Kokobace R*	lb.	.17½	- .18½
Lipal 9-N*	lb.	.28	- .29
7-O*	lb.	.29	- .30
Lubrex	lb.	.25	- .30
Lubri-Flo*	gal.	10.00	- 12.00
Migralube*	lb.	—	- .35
ML-1027-2C*	gal.	—	- 2.65
ML-1028-2C*	gal.	—	- 2.65
Mold Lubricant No. 72 Conc.* (dms.)	gal.	—	- 1.90
Mold Lubricant No. 426* (dms.)	lb.	.18	- .17
No. 735* (dms)	gal.	—	- 1.25
No. 769* (dms.)	gal.	—	- 1.20
No. 825* (dms.)	gal.	—	- 2.00
No. 856* (dms.)	gal.	—	- 1.90
No. 880* (dms.)	gal.	—	- 1.19
No. 887* (dms.)	gal.	—	- 1.80
No. 935* (dms.)	gal.	—	- 1.56
No. 956* (dms.)	gal.	—	- 2.50
No. 965* (dms.)	gal.	—	- 2.15
No. 967* (dms.)	gal.	—	- 2.40
No. 969* (dms.)	gal.	—	- 1.50
No. 970* (dms.)	gal.	—	- 4.50
No. 975* (dms.)	gal.	—	- 2.85
No. 980* (dms.)	gal.	—	- 1.53
No. 987* (dms.)	gal.	—	- 2.45
A 187* (dms.)	gal.	—	- 1.90
A 256* (dms.)	gal.	—	- 1.20
A 988* (dms.)	gal.	—	- 2.60
Moldeze No. 3*	gal.	—	- 4.95
Mold-Brite*	gal.	—	- 1.50
Monopole Oil MD*	lb.	—	- .16
MR-22 Silicone Semi-Permanent	gal.	9.95	- 14.95
Olate Flakes*	lb.	.23½	- .24¾
Orvus WA Paste* (dms.)	lb.	—	- .23¾
Plaskon Polyethylene S*	lb.	.32	- .47
Poly-Brite PE-20	lb.	.28	- .42
600	lb.	.42	- .58
Poly-Cone 125X	lb.	1.15	- 1.30
1,000	lb.	.91	- 1.04
Polyglycol 15-200*	lb.	.25	- .28¾
E4000*	lb.	.31	- .37
Prodag*	lb.	.32	- .60
Purity Flake* (dlvd.)	lb.	.14¾	- .16½
Rubber-Flo*	gal.	1.25	- 2.00
Rubber-Glo*	gal.	—	- .94
Rusco Mold Paste*	lb.	.25½	- .32
Sericite* (l.c.l.)	ton	65.00	- 75.00
Silicone Oil A145*	lb.	3.22	- 3.61
A220* (dms.)	lb.	—	- 2.80
Silrex (dms.)	lb.	—	- .65
Rubars*	lb.	—	- .22¾
Soybean Lecithin	lb.	.13	- .17
Thermalube*	lb.	—	- .13¾
UC Silicone L-45*	lb.	2.90	- 4.61
L-522*	lb.	2.68	- 3.50
LE-45*	lb.	1.15	- 1.69
LE-450*	lb.	1.15	- 1.69
Ucon Lubricants*	lb.	.26¾	- .27¾
Ulco Mold Soap*	lb.	.19	- .29

LUBRICANTS, RUBBER

Cyclolube NN-1; NN-2; NN-3	gal.	.12½	- .20½
NN-4	gal.	.13½	- .21½
114	gal.	.19	- .27
4053	gal.	.21	- .29
Diglycol Stearate Neutral (and SE) (dms.)	lb.	—	- .25
Extrud-o-Lube*	gal.	1.33	- 1.54
Ivory Chips*	lb.	.19¾	- .20¾
LatexLube GR* (dlvd)	lb.	.19¼	- .21½
No. 82-A* (450 lb. dms.)	lb.	—	- .08¾
Nopcowax 22-DS*	lb.	.38½	- .41
Propylene Stearate (dms.)	lb.	.35	- .60
Versa-Lube B*	lb.	.16	- .18

LUBRICANTS, RUBBER SURFACE

Antidust	lb.	.37	.41
Barium Stearate	lb.	.41	.46
Calcium Stearate	lb.	.39	.44
Crown Brand*	lb.	.37	.42
D.C. 7 Compound*	lb.	4.70	5.80
D.C. 200 Fluid*	lb.	2.90	3.47
ELA*	lb.	—	.82
G-E Silicone Fluid SF-92*	lb.	3.04	4.25
Glycerized Lubricant*	gal.	1.25	1.48
Glydag B*	lb.	1.60	2.25
Glyso-Lube* (dms.)	lb.	—	.14
No. 3* (dms.)	lb.	—	.14
Hydro-Zinc*	lb.	—	.20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼	.19¼
R-66*	lb.	—	.17¼
Liqui-Lube* (dlvd.)	lb.	—	.17¾
N.F.* (dlvd.)	lb.	—	.17¾
N.T.* (dlvd.)	lb.	—	.16¾
Lubrex*	lb.	.27	.32
Lubri-Cote	gal.	.86	1.00
Magnesium Stearate	lb.	.42	.47
Crown Brand*	lb.	.40	.45
Polyethylene Glycol	lb.	.22	.26
Rexanol*	lb.	—	.13
Rubber Free (Concentrate)*	gal.	—	1.44
Jel*	lb.	.18	.21½
Separex*	lb.	.08½	.10½
Slab-Dip* (dms.)	lb.	—	.17
Soybean Lecithin	lb.	.13	.17
Stock-Lube*	lb.	—	.19
UC L-45*	lb.	2.90	4.61
L-522*	lb.	2.68	3.50
LE-450*	lb.	1.15	1.69
XL-42*	lb.	3.10	4.75
XLE-42*	lb.	1.22	1.70
XLE-420*	lb.	1.18	1.70
Wet Zinc*	lb.	—	.22¼
CW*, P*	lb.	—	.20
Zinc Stearate	lb.	.41	.46

MOLD CLEANERS

Actusol* (dlvd.)	gal.	1.45	1.65
Alkon* (dlvd.)	lb.	.16	.16½
CA-301*	gal.	—	2.49
CA-302*	gal.	—	2.63
G-O 6910*	lb.	.38	.40
Metso Anhydrous*	cwt.	5.70	7.95
Metso 99*	cwt.	5.00	7.25
200*	cwt.	6.70	8.95
Granular*	cwt.	4.45	6.70
Orvus Extra Granules*	lb.	.23¼	.24¼
Polo*	lb.	.12¾	—
Rubber-Sol*	gal.	2.97	3.97
Sheiblast*	lb.	.04	.08¾
Sprex A.C.* (dlvd.)	lb.	.17¾	.18¾
Zip Mold Cleaner*	gal.	1.05	1.55

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95	1.25
Pepton 22 Plasticizer*	lb.	.83	.86
65*	lb.	1.23	1.26
65B*	lb.	.83	.86
Pitt-Consol 640 (dms.)	lb.	—	.42
646 (dms.)	lb.	—	.52
RPA 2*	lb.	—	.85
3*	lb.	—	.51
3 Conc.*	lb.	—	.85
6*	lb.	—	1.66

PLASTICIZERS & SOFTENERS

Actisil	lb.	.26	.27
Acto 500*	lb.	—	.08
Adipol BCA*	lb.	.46	.46½
2EH*	lb.	.37½	.39
10A*	lb.	.37½	.39
ODY*	lb.	.37½	.39
XX*	lb.	.37½	.39
Admex 562 (dms.)	lb.	.50¾	.51¾
710 (dms.)	lb.	.35¾	.36¼
711 (dms.)	lb.	.37¾	.38¼
744 & 745 (dms.)	lb.	.41¾	.42¼
760 (dms.)	lb.	.59¾	.60¼
761 (dms.)	lb.	.46¾	.47¼
770 (dms.)	lb.	.42¼	.43
Anhydrol 6990*	lb.	.51	.56
Arneel SD*	lb.	.34	.40
Arolene 1980* (c.l.)	lb.	—	.10
Aromatic Plasticizer 10* (and 25*) (dms.)	lb.	.08	.08½
Aromatic Tar	gal.	.0573	.1973
Bardol*	lb.	.02¾	.03¾
B*	lb.	.06¼	.06½
Bayol D*	gal.	—	.382
F*	gal.	—	.52
Bearflex 1751*	lb.	.14	.15
LPO*	lb.	.03	.04
MPO*	lb.	.03¾	.04¾
Beeswax, Bleached	lb.	73	.75
Yellow Refined	lb.	.64	.65
Bondogen*	lb.	.55½	.60½
B.R.C. No. 20*	lb.	.0150	.0175
No. 21*	lb.	.02¾	.03
No. 22*	lb.	.02½	.02¾
B.R.H. 2*	lb.	.0213	.0351
BRS 700*	lb.	.0200	.0285
B.A.T. 3*	lb.	.0180	.0265
4*	lb.	.0250	.0260
7*	lb.	.0300	.0310

PLASTICIZERS & SOFTENERS (Cont'd)

B.R.V.*	lb.	.0475	.0565
Bunarex Resins*	lb.	.07	.08
Bunatak AH*	lb.	—	.09½
N*	lb.	—	.31
U*	lb.	—	.17½
No. 90*	lb.	—	.09
No. 210*	lb.	—	.14
Butac*	lb.	.1585	.1685
Butyl Carbitol Periargonate (dms.)	lb.	—	.64½
Butyl Cellosolve Periargonate (dms.)	lb.	—	.68
Butyl Oleate	lb.	.26	.27
Butyl Palmitate	lb.	—	.26½
Butyl Stearate (dms.)	lb.	.28½	.29½
Byerflux*	gal.	.28½	.29½
Califlux 510* (and 550*)	lb.	.02¾	.03¾
G.P.*	lb.	.01½	.02½
R-100*	lb.	.04¼	.05¾
LBL*	gal.	.17	.25
OSR*	lb.	.01⅞	—
RC*	gal.	.13½	.21½
TT*	lb.	.0195	.0295
Candelilla Wax, Prime	lb.	.53	.64
Refined Light	lb.	.56	.60
Carbowax 4000* (dms.)	lb.	.68	.70
Cardolite NC-103*	lb.	.36	.59
Carnauba Wax, Crude	lb.	.73	.74
Flaked	lb.	.73	1.25
Refined, Technical	lb.	.73	.74
Refined, Pure	lb.	.82	.86
Yellow	lb.	1.10	1.15
Celluflex* (dms.)			
112* (t.c., dlvd.)	lb.	—	.32½
179-A* (t.c., dlvd.)	lb.	—	.32½
179-C* (t.c., dlvd.)	lb.	—	.32½
179-EG* (t.c., dlvd.)	lb.	—	.32½
DBP* (t.c., dlvd.)	lb.	—	.30
DOP* (t.c., dlvd.)	lb.	—	.28½
TPP* (dms., eqld.)	lb.	—	.40
Ceresin Wax	lb.	.12	.30
Chlorowax 40*	lb.	.15	.17½
50*	lb.	.16	.18½
70*	lb.	.18½	.20
LV*	lb.	.17	.19½
CTLA Polymer*	gal.	.20	.36
Cumar Resins*	lb.	.07	.19
Cyclolube OSR*	gal.	.28	.36
Darex DBM*	lb.	.30½	.34
DBP*	lb.	.30	.33½
DOP*	lb.	.30½	.33½
DIOP*	lb.	.30½	.33½
D.B.M.*	lb.	.32	.34¾
Decylbutyl Phthalate	lb.	.27	.29½
Degras, Common	lb.	—	.14
Diallyl Phthalate	lb.	.51½	.52½
Dibenzyl Sebacate (dms.)	lb.	.93	.93½
Dibutoxyethyl Sebacate	lb.	—	.61½
Dibutyl Phthalate (dms.)	lb.	.30½	.32
Dibutyl Sebacate	lb.	.67½	.68½
Dicapryl Adipate (dms.)	lb.	.41½	.42½
Dicapryl Phthalate (dms.)	lb.	.27½	.29
Dicapryl Sebacate	lb.	.58	.59½
Di-Carbitol Phthalate (dms.)	lb.	.50½	.51
Dicyclohexyl Phthalate	lb.	.45	.46½
Diethyl Phthalate (dms.)	lb.	.28¼	.29¾
Di-2-ethylhexyl Phthalate (dms.)	lb.	.26	.27½
Dihexyl Adipate (dms.)	lb.	.46½	.47½
Dihexyl Phthalate (dms.)	lb.	.32½	.33½
Dihexyl Sebacate (dms.)	lb.	.66	.66½
Diisobutyl Azelate	lb.	—	.47¼
Diisobutyl Phthalate	lb.	.29	.30½
Di-iso-octyl Adipate	lb.	.42½	.43½
Dimethyl Phthalate (dms.)	lb.	.28¼	.29¾
Dimethyl Sebacate (dms.)	lb.	1.30	1.30½
Dinonyl Adipate	lb.	.44¼	.47½
Dinopol IDO*	lb.	.26½	.28
MOP*	lb.	.27½	.29
Dioctyl Adipate (dms.)	lb.	.42½	.43½
Dioctyl Phthalate (dms.)	lb.	.26	.27½
Dioctyl Sebacate (dms.)	lb.	.61¼	.62¼
D.I.O.P. (dms.)	lb.	.28½	.30
Dipolymer Oil	gal.	.33	.48
Dispersing Oil No. 10*	lb.	.06	.06¼
Dutrex* 1, 6, 7	gal.	.18	.23
6H	gal.	.13	—
15E	gal.	.11	.23
20, 25	lb.	.03	.06
33	gal.	.21	.33
DX-111	lb.	.13¼	.14¼
DX-111 NS	lb.	.14¼	.15¼
DX-40	lb.	.14¾	.15¾
Elastex 10-P*	lb.	.30½	.33½
50-B*	lb.	.25	.28
DCHP*	lb.	.59	.60
Emulphor EL-719*	lb.	—	.58
Epoxy Plasticizer	lb.	.33½	.36
Drapex 3.2*	lb.	.39¼	.40¼
Drapex 4.4*	lb.	.34¾	.35¾
Drapex 7.7*	lb.	.37	.38
Esparto Wax	lb.	—	.55
Estac*	lb.	—	.16
Facile Gum 4A*	lb.	.48	.50
Flexol B-400*	lb.	.29	.30
DOP*	lb.	.29	.30½
TOF*	lb.	.47	.48
3GH*	lb.	—	.46¾
3GO*	lb.	—	.55¾
4GO*	lb.	—	.36½
426*	lb.	.28½	.30
Flexricin P-1*	lb.	.33½	.36½
P-4*	lb.	.30½	.33¼
P-6*	lb.	.37	.40
P-8*	lb.	.30¼	.33¼

PLASTICIZERS & SOFTENERS (Cont'd)

Fortex A* (dms.)	lb.	.12½	.14½
Fura-Tone NC-1008*	lb.	.28	.39
Galex W-100*	lb.	.15½	.19¼
Good-rite GP233*	lb.	.40	.43½
GP235*; GP236*	lb.	.40	.43½
GP261*	lb.	.28	.31½
GP265*	lb.	.28½	.32
GP266*	lb.	.29	.32½
GP-266-BPA*	lb.	.29	.32½
Hallco C-255-NS*	gal.	.27½	.29½
C-566*	lb.	.11	.13
Harflex 300* (dms.)	lb.	.60½	.61
325* (dms.)	lb.	.45	.45½
330* (dms.)	lb.	.46¼	.46¾
375* (dms.)	lb.	.76	.76½
HB20*	lb.	.17	.18½
HB40*	lb.	.21½	.23
Herron-H.T.*	gal.	.16	.27
Herron-Plas*	lb.	—	.03¼
Herron-Wax*	lb.	.05¼	.06
No. 23*	lb.	.08¾	.08¾
No. 24*	lb.	.07¾	.07¾
HSC No. 13*	lb.	.25	.32
No. 39*	gal.	.22	.29
Indonex W-2*	gal.	.12	—
Isooctyl Decyl Phthalate (dms.)	lb.	.28	.29½
K-stay*	lb.	.12	.13
Kapsol*	lb.	.35	.35½
Kenflex A & N*	lb.	.19	.34
Kesscoflex BCL* (dms.)	lb.	—	.37
BCO* (dms.)	lb.	—	.33
BCP* (dms.)	lb.	—	.36
BCS* (dms.)	lb.	—	.32
BO* (dms.)	lb.	—	.28¼
BS* (dms.)	lb.	—	.27½
DBT* (dms.)	lb.	—	.68
DIOA* (dms.)	lb.	—	.43½
DOA* (dms.)	lb.	—	.43½
MCO* (dms.)	lb.	—	.35½
MCP* (dms.)	lb.	—	.41
MCS* (dms.)	lb.	—	.35
TRA* (dms.)	lb.	—	.40
KP 20*	lb.	.26	.27½
23*	lb.	.32½	.33½
48*	lb.	.25½	.27
90*	lb.	.42½	.44
140*	lb.	.48	.48½
177*	lb.	.49¾	.50¼
201*	lb.	.47	.48½
260*	lb.	.35½	.37
310*	lb.	.30	.31½
Kremol 40*	gal.	.36	.46
50*	gal.	.39	.49
Kronisol* (dms.)	lb.	.37¼	.38¼
Kronitex AA* (dms.)	lb.	.35	.36
I, K-3, MX*	lb.	.35	.36
Lanolin, Tech. Anhydrous	lb.	—	.26
Latex-Lube G.R.*	lb.	.19¼	.20
Lead Oleate	lb.	—	.29¾
Lindol* (dms., t.c.)	lb.	—	.32½
Locusol No. 1-6980*	lb.	.30	.34
2-Mercaptoethanol (dms.)	lb.	1.25	1.80
Methox*	lb.	.41	.42
Methyl Laurate	lb.	.25	.37
Methyl Oleate	lb.	—	.20
Methyl Stearate (dms.)	lb.	—	.10
Monoplex DOS*	lb.	.59½	.60½
DBS*	lb.	.65½	.66½
S-70*	lb.	.41	.42
S-71*	lb.	.46½	.47½
Montan Wax, Crude	lb.	.21	.26
Flaked	lb.	.29	.29
Morflex*	lb.	.32	.69½
Natac*	lb.	.1535	.1635
Nebony Resins* (dms.)	lb.	.04½	.05½
Neolene 210* (t.c.)	lb.	—	.16
212* (t.c.)	lb.	—	.14
220* (t.c.)	lb.	—	.15
Nerium*	lb.	—	.09
Nevillac Resins* (dms.)	lb.	.31	.85
Neville LX-880* (dms.)	lb.	.12	.13½
LX-685* (dms.)	lb.	.12	.17½
LX-782 (dms.)	lb.	.07½	.08½
LX-828* (dms.)	lb.	.11	.12½
LX-1000* (dms.)	lb.	.12	.13
Neville Resins* (dms.)	lb.	.07¼	.20
Nevindene Resins* (dms.)	lb.	.16½	.20
Nevinol* (dms.)	lb.	—	.24
No. 480 Oil Proof Resin*	lb.	—	.18
Ohopex Q10* (dms.)	lb.	.27½	.29
R9* (dms.)	lb.	.37¾	.37¾
OPD*	lb.	.29	.40
Ortho-Nitrobiphenyl	lb.	.13	.15
Ozokerite Wax, White and Yellow	lb.	.24	.31
Panaflex BN-1*	lb.	.18	.22¼
Panarez 3-210	lb.	.12½	.14
6-210	lb.	.12	.13½
12-210	lb.	.11½	.13
Paradene Resins (dms.)	lb.	.07¼	.08
No. 2 Flaked	lb.	.08	.08½
Para Flux* (dms.)	gal.	.22	.25
2016* (dms.)	gal.	.22	.26
Para Lube* (t.c.l.)	lb.	.046	.048
Paraplex G-25*	lb.	.76	.77
G-40*	lb.	.50	.51
G-50*	lb.	.40¾	.41¾
G-53*	lb.	.45	.46
G-60* (and G-61*)	lb.	.32¾	.32¾
G-62*	lb.	.33¾	.33¾
Parmo*	lb.	.06	.13¼
Peroxidol 780*	lb.	.33¼	.36¼
781*	lb.	.34¾	.37¾
Petroflux MV*	gal.	.097	.177
Petrolatum (dms.)	lb.	.04¼	.14¼

PLASTICIZERS & SOFTENERS (Cont'd)

PG-16*	lb.	—	.35
Philrich-5* (t.c.)	gal.	—	.12½
Picco 10* (and 25*)	lb.	.15	.15½
60* (and 75*)	lb.	.14½	.13
100*	lb.	.14½	.17
Piccocizer 30*	lb.	.06½	.07
Piccolastic A* (B*, C*, D* & E*)	lb.	.24	.25
FT* (FHX* & FX*)	lb.	.1695	.1745
T-135*	lb.	.19	.20
Piccolyte S Resins*	lb.	.20½	.23½
Piccopale Resins*	lb.	.1200	.1360
Piccoumaron Resins*	lb.	.07	.18
Pigmentar* Pigmentaroil*	lb.	.510	.684
Pitt-Consol 500* (dms.)	lb.	.30	.30½
Plastac M*	lb.	—	.09¼
Plasticil	lb.	.10½	.11¾
NS	lb.	.11½	.12¾
Plasticizer 2286*	lb.	—	.26¼
Plasticizer 4141*	lb.	.42½	.43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.45	.45¾
DP-316*	lb.	.32¾	.33½
DP-317*	lb.	.46	.47¼
DP-8732*	lb.	.44¾	.46
Plasticizer LP*	lb.	—	.07
Plasticizer MP*	lb.	—	.08
Plasticizer MT-511*	lb.	—	.69¼
Plasticizer OLN*	lb.	.36	.42
Plasticizer SC*	lb.	.42	.46
Plasticizer W-13*	lb.	.37	.38¼
Plastoflex 3*	lb.	—	.52
52*	lb.	.37¼	.3o¼
VS*	lb.	.41¼	.42¼
Plastogen*	lb.	.08¼	.09
Plastolein 9050* (c.l.)	lb.	.54½	.56½
9055*	lb.	.30½	.32½
9058*	lb.	.48	.50
9250*	lb.	.38¼	.40¼
9715*	lb.	.39	.40
Plastone	lb.	.23	.27
Polycizer 162*	lb.	.23½	.27½
332*	lb.	.35	.39
562*	lb.	.24	.28
662* and 662-BPA	lb.	.24	.28
532 and 632*	lb.	.35	.39
Polyco 438*	lb.	.34	.35
Polymel C-130*	lb.	.13¼	.14¼
D*	lb.	.22½	.23½
6*	lb.	.05¾	.07¼
Poly-Sperse AP-2	lb.	.23	.29½
AP-300, LC-20	lb.	.26	.32½
Poly-Sperse R-100	lb.	.17	.23½
Process Oil C-255* (c.l.)	gal.	.27½	.29½
Propylene Stearate (dms.)	lb.	—	.32
PRR 1*	gal.	.15	.35
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
400 Pine Tar* (600* & 800*) (t.c., dms.)	lb.	.0440	.0630
PX-104* (dms.)	lb.	.28	.30½
PX-108* (dms.)	lb.	.23½	.26
PX-138* (dms.)	lb.	.23½	.26
PX-208* & 238* (dms.)	lb.	.35	.37½
PX-404* (dms.)	lb.	.65½	.67½
PX-438* (dms.)	lb.	.57	.59
PX-800* (dms.)	lb.	.32¼	.34¼
PX-917* (dms.)	lb.	.32½	.35
RC Plasticizer B-17* (dms.)	lb.	.23½	.24½
O-16* (dms.)	lb.	.30	.31
TG-8*&TG-9* (dms.)	lb.	.34½	.35½
TG-85* (dms.)	lb.	.36½	.37½
RC Polymeric BGA* (dms.)	lb.	.45½	.46½
Reogen*	lb.	.14¼	.14½
Resin C*	lb.	.0225	.0310
731D	lb.	.17½	.18¾
Resinex*	lb.	.03¾	.05½
L-4*	lb.	.02¼	.04¼
Rexflex*	lb.	—	.15
Rosin Oil	gal.	.80	1.35
RR-10 (Neoprene)*	lb.	—	.37
R.S.O. Softening Oil*	lb.	.03	.05
RuBars*	lb.	.19¼	.20
Rubberol*	lb.	.18	.25¼
SP Resins	lb.	.2900	.4775
Santicizer B-16*	lb.	.46¾	.47¾
E-15*	lb.	.53	.54
M-17*	lb.	.44	.45
No. 140*	lb.	.35	.36
No. 141*	lb.	.36½	.37½
No. 160*	lb.	.27½	.29
No. 602*	lb.	—	.28½
No. 603*	lb.	.27	—
Sherolatum*	lb.	.03½	.06
Staflex DBES*	lb.	.58½	.61½
DOS*	lb.	.59¼	.62¼
IXA*	lb.	.32	.35
KA*	lb.	.34	.36¾
Stan Chlor Oils*	lb.	.13½	.20½
70*	lb.	.17½	.30
Stanolind Petrolatum*	lb.	.07	.156
Wax*	lb.	.31	.33
Staybelite Resin	lb.	.13¾	.15
Sunny South Burgundy Pitch*	lb.	.123	.1285
Rosin Oil*	gal.	.605	.76
Superla Wax*	lb.	.30	.397
Syncera Wax*	lb.	.16	.267
Syn Tac* (c.l.)	gal.	—	.33
Synthetic Revertant Oil	lb.	—	.16
Tarpine	lb.	.035	.050

PLASTICIZERS & SOFTENERS (Cont'd)

Terpene A*	gal.	—	.65
Tetrafiex R-122*	lb.	.27	.30½
TP-90B*	lb.	.59	.69
TP-95*	lb.	.65	.75
Transphalt Resins*	lb.	.03¾	.05¾
Tributyl Phosphate	lb.	.52½	.53½
Tricresyl Phosphate	lb.	.35	.36
Triphenyl Phosphate	lb.	.41½	.43½
Turgum S*	lb.	.1410	.1510
Turgum SB*	lb.	.09½	.10½
Turpol NC-1200*	lb.	.67	.70
NC-1300*	lb.	—	.50
Vistac No. 1*	gal.	1.00	1.21
P*	lb.	.18	.18½
Vopcolene 50*	lb.	—	.31
Witcizer 100*	lb.	.26	.27
200*	lb.	.22¼	.25¼
300*	lb.	.30	.33½
312*, 313*	lb.	.28	.31½
412*	lb.	.42½	.46

PROCESSING AIDS

Castor Oil, Blown (dms)	lb.	.25½	.26½
Refined (dms.)	lb.	—	.18½
Castorwax*	lb.	.25	.31
Dutrex 7*	lb.	.12	.20
ELA*	lb.	—	.82
Foamnix*	lb.	.60	1.50
Hydrofol Glycerides 200*	lb.	.15½	.19¾
Kenflex N*	lb.	.19	.26
Maleic Anhydride	lb.	—	.27
Millrex*	lb.	—	.15
Nadic Anhydride	lb.	—	.75
Polycin*	lb.	—	.24½
R-B-H Resin 510*	lb.	.19	.26
530*	lb.	.25	.32
STAYB*	lb.	.25	.45
Thiomalic Acid	lb.	—	3.50
Webnix*	lb.	1.25	2.00
Zyrox*	lb.	.78	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	lb.	.12¾	.21
Alcogum*	lb.	.08½	.24
Alpha Protein	lb.	—	.23
Aroostoocrat*	lb.	—	.07½
Carob Bean Flour	lb.	—	.50
Casein	lb.	.22	.35
Emcol K-8300* (dms.)	lb.	.14	.18
Ethylene Diamine 68%	lb.	.44	.47
Gum Arabic	lb.	—	.23
Karaya Gum	lb.	—	.35
Locust Bean Gum	lb.	—	.50
Modicol VD*	lb.	.13⅜	.15⅞
Prosein*	lb.	—	.06
Stablex B*	lb.	.50	.95
K*	lb.	.27	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.34	.35
Armeen C*	lb.	.46	.52
Mixed Crude*	lb.	.19	.25
T*	lb.	.32	.38
Blend No. 27 Oil	gal.	.35	.42
Burco RA*	lb.	.051	.081
BWH-1*	gal.	.16	.17
C-6 Oil* (28* & 32*)	gal.	.33	.38
C-10 Oil*	gal.	.25	.30
C-33* (t.c.)	gal.	—	.21½
C-42* (t.c.)	gal.	—	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	—	5.20
Liquid 50% (t.c.)	cwt.	—	2.90
Solid 76% (c.l., dms.)	cwt.	—	4.80
Cresylic Acid (99-100%)	gal.	.85	1.39
D-4* (t.c.)	gal.	—	.27
E-5* (t.c.)	gal.	—	.25
Flake Calcium Chloride (77-80%)	ton	—	31.00
(94-97%)	ton	—	39.80
Gensol No. 6* (t.c.)	gal.	—	.42
Heavy Aromatic Naphtha	gal.	.13¼	.18½
LX-572 Reclaiming Oil*	gal.	.27	.32
LX-777 Reclaiming Oil*	gal.	.23	.33
Neo-Fat D-242*	lb.	.05½	.07¾
42-70*	lb.	.08¼	.10¼
No. 517 H.B. Oil*	gal.	.11½	.16½
535*	gal.	.22	.27
Nucom* (t.c.)	gal.	—	.42
Pitt-Consol 500 (dms.)	lb.	.25	.25½
500 NS* (dms.)	lb.	.33	.33½
640 (dms.)	lb.	.42	.42
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
Q Oil* (t.c.)	gal.	—	.286
Reclaiming Oil 3186-G*	gal.	.26	.33
Reclaiming Reagent No. 1431*	lb.	.21	.25
R.P.A. No. 3*	lb.	—	.51
RR-10*	lb.	—	.37
Soda Ash (c.l., bags)	cwt.	—	1.85
Solvenol No. 1	gal.	.50	.67
No. 2	gal.	.41	.62
Solvent 534*	gal.	.20½	.26½
Solvent Oil 21*	gal.	.24	.29
C-42*	gal.	.23	.38
701 Oil*	gal.	.27	.29

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0850	.1625
Continental A*	lb.	.0850	.1625
Kosmobile HM (and S-66)	lb.	.0850	.1625
Micronex Standard*	lb.	.0850	.1625
Spheron 6*	lb.	.0850	.1625
Texas M*	lb.	.0850	.1625
Witco No. 1*	lb.	.0850	.1625

Channel, Easy Processing (EPC) (bags)

Collocarb*	lb.	.0710	.1485
Continental AA*	lb.	.0850	.1625
Kosmobile 77*	lb.	.0850	.1625
Micronex W-6*	lb.	.0850	.1625
Spheron 9*	lb.	.0850	.1625
Texas E*	lb.	.0850	.1625
Witco No. 12*	lb.	.0850	.1625
Wyex EPC*	lb.	.0850	.1625

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600	.3500
Dixie 5 Dustless*	lb.	.1400	.2250
Kosmos-Dixie BB*	lb.	.2600	.3500
Texas MC-74-BD*	lb.	.2600	.3500
Voltex*	lb.	.2600	.3500

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875	.1550
Continex CF*	lb.	.1100	.1700
Kosmos CF*	lb.	.0925	.1600
Shawinigan Acetylene Black*	lb.	—	.1900
Vulcan C*	lb.	.1100	.1850

Extra-Conductive Furnace Black (ECF) (bags)

Vulcan XC-72 (pellets)*	lb.	.2500	.3400

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675	.1350
Continex FEF*	lb.	.0675	.1350
Dixie 50*	lb.	.0675	.1350
Kosmos 50*	lb.	.0675	.1350
Philblack A*	lb.	.0675	.1350
Statex M*	lb.	.0675	.1350
Sterling SO*	lb.	.0675	.1350

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725	.1400
Sterling 99*	lb.	.0725	.1400

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600	.1275
Continex GPF*	lb.	.0600	.1275
Dixie 35*	lb.	.0600	.1275
Kosmos 35*	lb.	.0600	.1275
Statex G*	lb.	.0600	.1275
Sterling V*	lb.	.0600	.1275
V (Non-Staining)	lb.	.0600	.1275

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775	.1450
Continex HAF*	lb.	.0775	.1450
Dixie 60*	lb.	.0775	.1450
Kosmos 60*	lb.	.0775	.1450
Philblack O*	lb.	.0775	.1450
Statex R*	lb.	.0775	.1450
Vulcan 3*	lb.	.0775	.1450

Furnace, High Modulus (HMF) (bags)

Continex HMF*	lb.	.0625	.1300
Dixie 40*	lb.	.0625	.1300
Kosmos 40*	lb.	.0625	.1300
Modulex HMF*	lb.	.0625	.1300
Statex 93*	lb.	.0625	.1300
Sterling L* and LL*	lb.	.0625	.1300

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF*	lb.	.0575	.1250
Dixie 20*	lb.	.0575	.1250
Essex SRF*	lb.	.0575	.1250
Furnex*	lb.	.0575	.1250
Gastex*	lb.	.0625	.1350
Kosmos 20*	lb.	.0575	.1250
Pelletex* and NS*	lb.	.0575	.1250
Regal*	lb.	.0575	.1250
Shawinigan Acetylene Black*	lb.	—	.1900
Sterling NS* and S*	lb.	.0575	.1250
R*	lb.	.0625	.1350

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace Super Abrasion (SAF) (bags)

Aromax SAF	lb.	.1150	.1825
Dixie 85	lb.	.1150	.1900
Kosmos 85	lb.	.1150	.1900
Philblack E*	lb.	.1150	.1900
Statex 160*	lb.	.1150	.1900
Vulcan 9*	lb.	.1150	.1900

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925	.1600
Continex ISAF*	lb.	.0925	.1600
Dixie 70*	lb.	.0925	.1600
Kosmos 70*	lb.	.0925	.1600
Philblack I*	lb.	.0925	.1600
Statex 125*	lb.	.0925	.1600
Vulcan 6*	lb.	.0925	.1600

Furnace, Super Conductive (SCF) (bags)

Conductex SC*	lb.	.1150	.1800
Vulcan SC*	lb.	.1800	.2550

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	—	.0625
Sterling FT (c.l.)	lb.	—	.0625

Thermal, Medium (MT) (bags)

Sheilblack*(†)	lb.	—	.0250
Sterling MT (c.l.)	lb.	—	.0450
MT Non-Staining (c.l.)*	lb.	—	.0550
Thermax (c.l.)*	lb.	—	.0450
Stainless (c.l.)	lb.	—	.0550

Specialty Blacks (Awaiting Classification)

Neotex 100*	lb.	.0775	.1450
Neotex 130*	lb.	.0925	.1600
Neotex 150*	lb.	.1150	.1900
Regal 300*	lb.	.0775	.1450
Regal 600*	lb.	.0925	.1600

REINFORCING AGENTS—SILICA

Cab-o-sil*	lb.	.66	1.25
D. C. Silica (pelletized)*	lb.	1.45	1.65
Hi-Sil 233*	lb.	.08¼	.09¾
X303*	lb.	.50	.60
Santocel*	lb.	.62	.64
Ultrasil VN-3*	lb.	.35	.65
Valron Estersil*	lb.	2.00	2.25

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.40	.50
Cato 2* (100 lb. bag)	lb.	17.00	—
Darex Copolymer No. 3*	lb.	.47	.49
43G*	lb.	.39	.41
Darex Copolymer Latex No. 3-L	lb.	.41½	.46
Durez 12687 (and 12707)*	lb.	.36½	.40
Durez 13355*	lb.	.27½	.31½
Dymerex Resin	lb.	.15¾	.17
Good-rite Resin 2007*	lb.	.36	.38
2057*	lb.	.30	.31
Hystren*	lb.	.39	.41
Kralac A-EP*	lb.	.39	.41
Lampblack	lb.	—	.12
Marbon 8000*	lb.	.36	.43
Marmix*	lb.	.35	.43
Mistron Vapor*	lb.	—	.03½
HGO-55*	lb.	—	.05
Pliolite Latex 150*	lb.	.35	.39
Pliolite Resin-Rubber Masterbatches*	lb.	.33	.57
Pliolite NR*	lb.	.93	.95
S6B*	lb.	.36	.43
Polyco 220*	lb.	.18¼	.19¾
Poly-Phen 201-C; 218-C	lb.	.27½	.29
202-C	lb.	.36	.37½
Polypol S-70*	lb.	.25	.26

RETARDERS

Akron Benzoic Acid TBAO-2*	lb.	.41	.43
Dutch Boy Normasal*	lb.	—	.46
ESEN*	lb.	.39	.41
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder J*	lb.	.68	.70
PD*	lb.	.39	.41
W*	lb.	—	.46
Retardex*	lb.	.46	.46
TCM-25*	lb.	.60	.70
Wiltrol P	lb.	.37	.39

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	55.00	62.00
Hard Hydrocarbon Solid (dms.)	lb.	.03	.06
Granular (bags)	lb.	.03¾	.06¼
Herron Flake*	ton	—	45.00
Mineral Rubber, Solid	ton	42.50	44.50
M. R. No. 38*	ton	57.00	70.00

RUBBER SUBSTITUTES (Cont'd)

Vulcanized Vegetable Oils

Amberex*	lb.	.29	.36
Brown	lb.	.15	.24
Car-Bel-Lite*	lb.	.33½	.36
Neophax*	lb.	.17	.27
Car-Bel-Rex A and C*	lb.	—	.126
White	lb.	.15	.26
670 Brown	lb.	.14¼	.14¾

Miscellaneous Rubber Substitutes

Gilsowax B*	lb.	.09	.11
Resin No. 1098 (dms.)	lb.	—	.62
No. 1198*	lb.	.46¼	.49¼
Tysonite*	lb.	.30	.30¾

SOLVENTS

Acetone (dlvd.)	lb.	.09½	.11
Amsco Lactol Spirits* (t.c.)	gal.	—	.20
Naphthol Spirits*	gal.	—	.19
Mineral Spirits*	gal.	—	.18
Rubber Solvent* (t.c.)	gal.	—	.19
Solv A* (t.c.)	gal.	—	.22
Solv A-80* (t.c.)	gal.	—	.23½
Solv B* (t.c)	gal.	—	.28
Solv B-90* (t.c.)	gal.	—	.31
Solv D* (t.c.)	gal.	—	.30
Solv E*	gal.	—	.30
Solv F*	gal.	—	.30
Solv F-80*	gal.	—	.32
Solv G*	gal.	—	.36
Special Naphtholite* (t.c.)	gal.	—	.19
Special Textile Spirits*	gal.	—	.20
Super Hi-Flash Naphtha*	gal.	—	.34
Super Naphtholite*	gal.	—	.19
Textile Spirits* (t.c.)	gal.	—	.20
Amyl Chlorides, Mixed (l.c.l.) (dms.)	lb.	—	.11
Bensol 90%	gal.	.36	.40
Butyl Acetate	lb.	.17	.18½
Butyl Alcohol	lb.	.17	.19½
Secondary (dlvd.)	lb.	.15	.16½
Tertiary (dlvd.)	lb.	.15	.16½
Carbon Bisulfide, Tech.	lb.	.07	.08½
Carbon Tetrachloride	lb.	.10¾	.14¼
Cosol 1*	gal.	.37	.43
2*	gal.	.42	.48
Cyclohexane	gal.	.77	110.00
85% (c.l.) (dms.)	gal.	—	.56
Cyclohexanone	lb.	.31	.34½
Diacetone, Pure (dlvd.)	lb.	.15½	.17
Dichlorethyl Ether (dms.)	lb.	.15½	.16½
Dichloropentanes (l.c.l.) (dms.)	lb.	—	.06
Dicom*	gal.	—	.55
Halowax Oil*	lb.	.28	.41
Heptanes* (t.c.)	gal.	—	.1609
Hexanes (t.c.)	gal.	—	.1584
Isobutyl Acetate	lb.	.15¼	.16¾
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.62	.72
Ether, Ref. (dlvd.)	lb.	.09½	.11
Mersol*	gal.	.43	.79
Mesityl Oxide (dlvd.)	lb.	.15	.16½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.66	.72
Methyl Chloride	lb.	—	.12¾
Methyl Ethyl Ketone	lb.	.15	.16½
Methyl Isobutyl Ketone (dlvd.)	lb.	.17	.18½
Methylene Chloride	lb.	—	.12½
N-5 Pentane Mix* (t.c.)	gal.	—	.13½
N-6 Hexanes* (t.c.)	gal.	—	.14½
N-7 Hexanes* (t.c.)	gal.	—	.13½
Nelio Dipentene	gal.	.41	.62
Penetrell*	gal.	.41	.42
Perchlorethylene	lb.	.11¾	.15¼
Petrolene* (t.c.)	gal.	—	.14125
Picolines, Alpha, Refined	lb.	.43½	.44
Mixed	lb.	.32½	.33
Proprietary Solvent (dms.)	gal.	.66	.77
Propyl Acetate (t.c., dlvd.)	lb.	—	.11¾
Alcohol (t.c., dlvd.)	lb.	—	.11
Pyridine, Refined	lb.	.69½	.70
Quinoline	lb.	.50¾	.51¾
Rubber Solvent (t.c.)	gal.	—	.16
Rubsol (t.c.)	gal.	—	.12875
Skellysolve B (Hexanes)* (t.c.)	gal.	—	.16
C (Heptanes)* (t.c.)	gal.	—	.16¼
R (Rubber Solvent)*	gal.	—	.1390
Solvent, Crude, Light	gal.	.19	.28
Solvesso 100* (t.c.)	gal.	.33	.35
150 (t.c.)	gal.	.33	—
Sunny South DD Dipentine*	gal.	.41	.62
Sunny South DD Pine Oil*	lb.	—	.15
Sunray*	gal.	.1140	.1600
Toluene (dms.)	gal.	—	.38
Toluol (t.c.)	gal.	.25	.25
Trichlorethane	lb.	—	.12¾
Trichlorethylene	lb.	.12	.16¾
Triglycol Dichloride	lb.	.63	.64
Union Thinner 1* (t.c.)	gal.	—	.174
5* (dms.)	gal.	—	.199
7* (t.c.)	gal.	—	.164
2-50 W Hi-Flash*	gal.	—	.41
Xylol (t.c.)	gal.	.29	.30

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90	.93
BC-74*	lb.	.70	.75
BC-105*	lb.	.75	.80
CH-101*; CH-201*	lb.	.60	.65
E-82*	lb.	.90	.95
JCX*	lb.	.62	.67
L Paste*	lb.	.65	.70
SN*	lb.	.47	.52
T-10*	lb.	1.90	1.95
T-50-LT*	lb.	3.20	3.25
XBZ-155*	lb.	.69	.74
XC-143*	lb.	.90	.95
XE-98*	lb.	.53	.58
Amioca 50* 85* (bags)	lb.	11.11	11.26
Barca 10*	lb.	.65	.70
Barium Stearate	lb.	.41	.46
Basic Silicate White Lead	lb.	.16½	.17½
Cadmium Ricinoleate	lb.	—	2.00
Calcium Ricinoleate	lb.	—	.55
Dutch Boy DS-207*	lb.	—	.54
B*	lb.	—	.32½
Tribase*	lb.	—	.27½
Dythal*	lb.	—	.39½
Ferro 182* (dms.)	lb.	.70	.76
200* (dms.)	lb.	1.33	1.43
203* (dms.)	lb.	.87	.91
541* (dms.)	lb.	.35½	.45½
541A* (dms.)	lb.	.82	.86
700* (dms.)	lb.	.48¾	.58¾
900* (dms.)	lb.	.90	.94
903* (dms.)	lb.	.60	.64
909* (dms.)	lb.	.91	.95
920*	lb.	—	.98
931* (dms.)	lb.	.75¾	.85¾
993* (dms.)	lb.	.89	.99
1203* (dms.)	lb.	1.30	1.40
1206* (dms.)	lb.	1.32	1.36
1820* (dms.)	lb.	.90	.94
1825* (dms.)	lb.	1.00	1.04
1976*	lb.	.47	.51
Harshaw 1-V-3*	lb.	.43	.45
1-V-4*	lb.	.68	.70
1-V-7*	lb.	.70	.72
2-V-4*	lb.	.85	.87
2-V-8*	lb.	1.31	1.33
5-V-1*	lb.	.41	.43
6-V-1B*	lb.	—	.55
6-V-2*	lb.	.62	.72
6-V-6*	lb.	.62	.72
6-V-10*	lb.	.62	.72
7-V-2*	lb.	1.00	1.10
8-V-1*	lb.	.89	.99
8-V-100*	lb.	.89	.99
9-V-1*	lb.	.77	.87
12-V-5*	lb.	.73	.75
24-V-1*	lb.	1.10	1.12
128-V-5*	lb.	.86	.88
Istabelan No. 115 Liquid	lb.	.85	.95
No. 120 Liquid	lb.	.65	.75
Kosol* (50 lb. bags)	lb.	19.00	—
Lithium Stearate	lb.	.52	.57
Fluffy	lb.	.47½	.70
Standard	lb.	.52½	.75
Mark A*	lb.	2.80	3.15
C*	lb.	.81	.84
E*	lb.	.72	.75
GS*	lb.	.77	.80
LL*	lb.	.59	.62
KCB*	lb.	.59	.62
M*	lb.	.59	.62
PL*	lb.	.62	.65
TT*	lb.	.72	.75
WS*	lb.	.97	1.00
X*	lb.	2.50	2.75
XI*	lb.	.87	.90
XV*	lb.	.84	.87
XX*	lb.	.57	.60
33*; 34*; 35*	lb.	.97	1.00
Metasap 613-A*	lb.	—	.69
613-B*	lb.	—	.84
613-C*	lb.	—	1.06
621*	lb.	—	.88
624*	lb.	—	.75
633*	lb.	—	.75
635*	lb.	—	.45
Modicol N*	lb.	.42½	.44½
S*	lb.	.30½	.32½
Nonisol 100	lb.	.38	.43
Sodium Silicates 41°/1:3.2	cwt.	1.20	2.30
Stabilizer No. 52*	lb.	1.90	2.00
89X*	lb.	.75	.80
B-5*	lb.	—	.70
E6B*	lb.	—	.95
G-1*	lb.	1.25	1.40
HR*	lb.	.85	.89
L*	lb.	—	.60
OM-10*	lb.	—	1.95
Staflex OY*	lb.	1.00	1.20
QXMA*	lb.	—	.70
Stayrite 10*	lb.	.36	.41
P-10*	lb.	.43	.45
15*	lb.	.55	.57
20*	lb.	.41	.46
22*	lb.	1.00	1.13
25*	lb.	.35	.40
70*	lb.	.70	.72
71*	lb.	.90	.92
75*	lb.	.61	.63
76*	lb.	.53	.55
80*; 90*	lb.	.70	.72
95*	lb.	.70	.72
229*	lb.	.61	.63

STABILIZING AGENTS (Cont'd)

Vanstay AC* (dms.)	lb.	.45	.48
CE* (dms.)	lb.	.44	.47
HT* (dms.)	lb.	.87	.90
HTA* (dms.)	lb.	1.02	1.05
HTB* (dms.)	lb.	.70	.73
HTC* (dms.)	lb.	1.09	1.12
HTE* (dms.)	lb.	.80	.83
HTF* (dms.)	lb.	.77	.80
L* (dms.)	lb.	.32	.35
R* (dms.)	lb.	.67	.70
RR*; RRZ* (dms.)	lb.	.59	.62
RZ-25* (dms.)	lb.	.66	.69
S* (dms.)	lb.	.57	.60
SA* (dms.)	lb.	.81	.84
Z* (dms.)	lb.	.62	.65

STIFFENING AGENTS

Polyac*	lb.	—	1.85
Processinfi Stiffener 710*	lb.	.88	.90
Solvitose HDF, H. C-S, T, and E*	lb.	.22	.25
Versatil Gum 8-E*	lb.	.15	.19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	.24
AA-1177*	lb.	.15½	.16½
Antisol*	lb.	—	.23
Antisun* (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone*	lb.	.31	.32
Microflake*	lb.	.20	.24
Nacconol NRSF*	lb.	.40½	.45
NBC*	lb.	—	1.67
Ross Sunproofing Waxes*	lb	—	.15
Sunolite*	lb.	.16	.22
127*	lb.	.16½	.20½
154*	lb.	.23	.25
Sunproof*	lb.	.32	.33
Improved*	lb.	.25	.26
Super*	lb.	.41	.42
Jr.*	lb.	.22	.23
Tonox*	lb.	.54	.56

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	.59
Anhydrol 6990*	lb.	.51	.56
6991*	lb.	.51	.56
Aquarex D*	lb.	—	.81
G*	lb.	—	.21
MDL*	lb.	—	.33
ME*	lb.	—	.82
NS*	lb.	—	.60
SMO*	lb.	—	.50
WAQ*	lb.	—	.22
Emulphor EL-620*	lb.	—	.40
EL-719*	lb.	—	.58
ON-870*	lb.	—	.55
Hyonics*	lb.	—	.28¾
Igepal CA-630	lb.	—	.29
CO-630; CO-730*	lb.	—	.29
CO-850; CO-880*	lb.	—	.29
Igepon CN-42*	lb.	—	.25
T-33*	lb.	—	.21
T-51*	lb.	—	.13½
T-77*	lb.	—	.49
Kessco 50201*	lb.	—	.44½
50203*	lb.	—	.44¼
18201*	lb.	—	.32
18203*	lb.	—	.35½
Lipal 9-N,* 11-0*	lb.	.28	.29
8-0,* 6-0*	lb.	.29	.30
25C,* 52C*	lb.	.34	.35
15T*	lb.	.23	.24
Nacconol NR (dlvd.)	lb.	.14½	.16
NRSF (dlvd.)	lb.	.40½	.45
Phosphonol 0* (dms.)	lb.	.40	.41
H* (dms.)	lb.	.80	.81
N* (dms.)	lb.	.50	.51
T* (dms.)	lb.	.60	.61
Pluronic L62*	lb.	.33½	.39
L64*	lb.	.33½	.39
Sellogen Gel*	lb.	—	.12¾
Soybean Lecithin	lb.	.13	.17
Synatol AV-60*	lb.	.28	.29

TACKIFIERS

Amalgamator Z-4*	lb.	.34	.35
Arcco 620-32B*	lb.	.20½	.21½
716-30*	lb.	.18½	.19½
1041-21*	lb.	.16½	.17½
Arcco A-2e*	lb.	.18	.19
Bunaweld Polymer No. 780*	lb.	—	.24
Galex* (dms.)	lb.	.17¼	.20
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	1.13	1.15
Liquid Rubber Flux*	lb.	—	.14
Nacconol NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	—	16.00
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
PR-162 Resin Emulsion	lb.	.82	—
Resin V	lb.	—	.23½
Synthol* (dms.)	lb.	.26	.30¼
Vistac A*	lb.	.21½	.22¾
Vistanex LM Grades*		—	.45
Zirex* (c.l.)	cwt.	—	15.25
82 Resin Solid (dms.)	lb.	.13½	.14½
84 Resin Solid (dms.)	lb.	.13½	.14½

THICKENERS (For Latex)

Alcogum AN-6*	lb.	.06	.06½
AN-10*	lb.	.09	.10
AN-25*	lb.	—	.31
PA-15*	lb.	.13½	.17½
PA-15-B*	lb.	.13½	.17½
Betanol* (dms.)	lb.	.70	.95
CM Starch* (100 lb. bags)	lb.	26.85	—
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.28½	.37
K-704*	lb.	.21	.22
K-705*	lb.	.30	.39
K-707*	lb.	.18	.19
K-708*	lb.	.28	.37
K-710*	lb.	.15	.16
Hycryl A-1000* (t.l.)	lb.	.090	.100
A-2000* (t.l.)	lb.	.335	.360
Hydroseal 3* (50 lb. bags)	lb.	9.19	—
Melojel* (100 lb. bags)	lb.	6.71	—
Modicol VD*	lb.	.13½	.15⅞
VE*	lb.	.13⅞	.16⅛
Polyco 296 BT*	lb.	.15	.16
296-N*; 530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.20	2.30
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Peroxide

Di-cup	lb.	1.10	—
T	lb.	1.10	1.50
R	lb.	1.60	2.00
40C	lb.	.55	.75
UC XK-1960*	lb.	5.50	—

Selenium

Vandex*	lb.	—	6.50
VA-7*	lb.	—	.50

Sulfur

Blackbirdd* (c.l.)	cwt.	—	2.90
Cloud* (c.l.)	cwt.	—	2.85
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	.16
Devil A* (c.l.)	cwt.	—	2.45
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	—	.39
Mist* (Wettable) (c.l.)	cwt.	—	4.05
Spider* (c.l.)	cwt.	—	2.85
Star* (c.l.)	cwt.	—	4.90
Sulfasan R*	lb.	—	1.55
Tire* (c.l.)	cwt.	—	2.45
Tube* (c.l.)	cwt.	—	4.90
Vultac 2*	lb.	.42	.74
3*	lb.	.51	.78

VULCANIZING AGENTS (Cont'd)

Tellurium

Telloy*	lb.	—	5.00

WETTING AGENTS

Advawet No. 10*	lb.	—	.17
No. 33*	lb.	—	.48
Aerosol 18*	lb.	.37	.42
AY*	lb.	.75	.80
MA 80%*	lb.	.40	.45
OT 75% Aqueous*	lb.	.40	.45
OT 100%*	lb.	.75	.80
OT-B*	lb.	.65	.70

WETTING AGENTS (Cont'd)

Alrosol* (dms.)	lb.	.36	.40
Alrosperse*	lb.	—	.18
Alrowet D 65*	lb.	.31	.34
Anhydrol 6990* 6991*	lb.	.51	.56
Armaca*	lb.	.28	.77
Arquads*	lb.	.42	.61
Emcol 5100* (dms.)	lb.	—	.31
Energetic W-100	lb.	.28½	.35
Etho-Chemicals*	lb.	.26	.58
Ethomeen S/15*	lb.	.48	.50
T/15*	lb.	.46	.48
Hyonic PE-90*	lb.	.25	.27
PE-100*	lb.	.25	.27
Kessco E-122* (dms.)	lb.	—	.45
18201*	lb.	—	.32
Kreelon 4D* (dms.)	lb.	.13	.16
8G* (dms.)	lb.	.26	.28
Kyro EO* (dms.)	lb.	—	.29¼
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅞
Nacconol A* (dlvd.)	lb.	—	.52
NRSF* (dlvd.)	lb.	.40½	.45
SL* (dlvd.)	lb.	.084	.10
60S* (dlvd.)	lb.	.19	.225
Nekal WS-25	lb.	—	.38
WS-99	lb.	—	.95
Orvus AB Granules*	lb.	.16¼	.17¾
Parnol*	lb.	—	.13½
Regal Beads	lb.	.12¾	.16¾
H. D. Beads	lb.	.12¾	.15¾
Santomerse No. 3 Paste*	lb.	.26	.30
Sorapon SF-73*	lb.	—	.18
SF-78*	lb.	—	.30
Sorbit P*	lb.	.29	.31
Soybean Lecithin	lb.	.13	.17
Stablex G*	lb.	.50	.90
Tergitol 4* (dms., dlvd.)	lb.	.36½	.37½
7* (dms., dlvd.)	lb.	.43½	.44½
O8* (dms., dlvd.)	lb.	.36½	.37½
P28* (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	—	.15
Vultamol*	lb.	—	.17½
Wetsit Conc.*	lb.	.35	.35

MISCELLANEOUS CHEMICALS

Aquesperse 30*	lb.	—	.11
Chiplac Paint	gal.	1.15	5.00
Copper Inhibitor No. 50*	lb.	—	1.20
D-Tac*	lb.	—	.22
Elastopar	lb.	2.05	2.07
2-Ethyl Hexanol	lb.	.23¼	.24¾
Fura-Tone Resin 1226*	lb.	.41	.43
MODX*	lb.	.38	.40
Nacconates*	lb.	.75	4.50
Para Resins*	lb.	.04	.04½
Pigmented Filmite* (dlvd.)	lb.	.16¾	—
Resorcin, Tech.	lb.	.77½	.81½
Rio Resin*	lb.	.70	.72
Rongalite CX*	lb.	—	.21½
Sherosopes*	lb.	.13½	.18¾
Sublac Resin PX-5*	lb.	.23½	.24½
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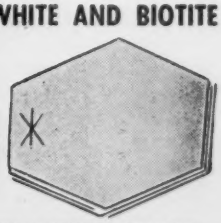

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* The author, by the way, is James Webb Young and, although we sell all kinds of books, we do *not* handle this one. It's available (Ninth Edition) for $2 from Advertising Publications, Inc., 200 East Illinois St., Chicago, Ill.

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1. The names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher, Palmerton Publishing Co., Inc., 101 West 31st St., New York 1, N. Y.; Editor, B. J. Kotsher, 101 West 31st St., New York 1, N. Y.; Business Manager, C. T. Jansen, 101 West 31st St., New York 1, N. Y.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address as well as that of each individual member, must be given.)

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3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are:

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5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required by Act of June 11, 1960 to be included in all statements regardless of frequency of issue) 4,929.

B. J. KOTSHER, Editor

Sworn to and subscribed before me this 29 day of September, 1961.
(SEAL) DAVID L. HENRIQUEZ
Notary Public, State of New York
No. 41-1761385 Qualified in Queens County
(My commission expires March 30, 1963)

Help Wanted Continued on Next Page

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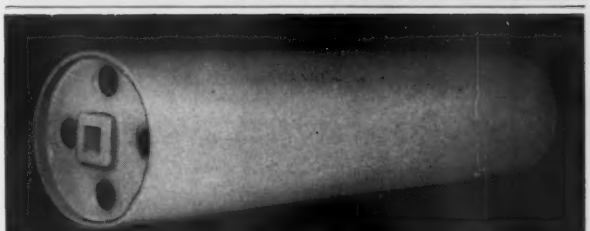

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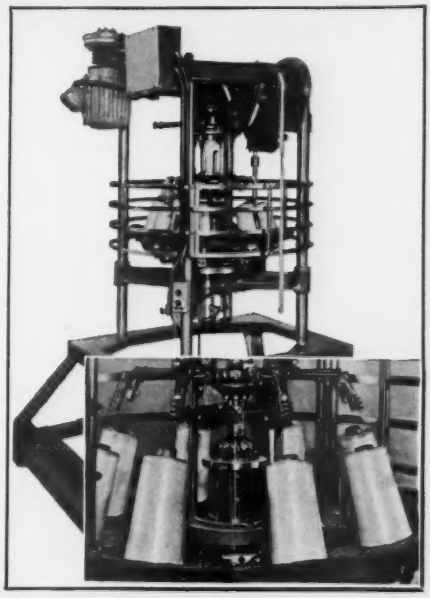

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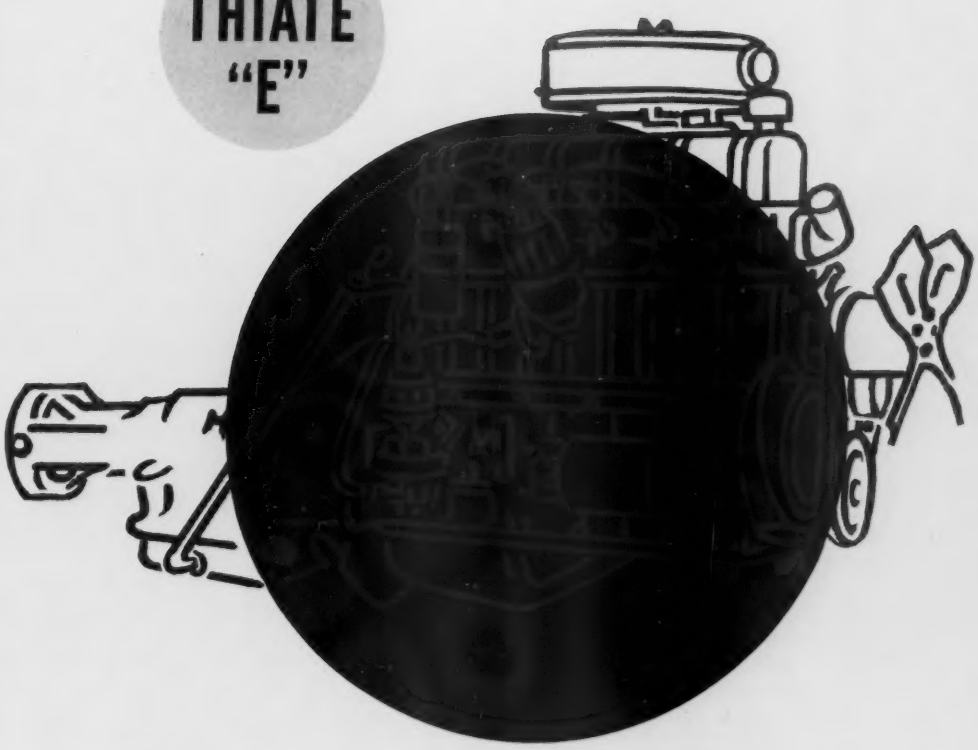

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